

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

The Agricultural Student

LIBRARY
RECEIVED
NOV 10 1914
U.S. Department of Agriculture



NOVEMBER 1914

Field Crops Number

15 Cents per Copy

\$1.00 per Year



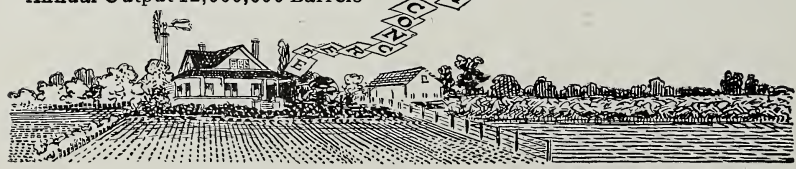
This Book Free to Farmers

It is a book of practical information on the building of concrete farm structures, large and small ; gives simple, direct instructions which anyone can follow.

We have a copy of this book for every farmer who is interested in building of concrete. Yours will be sent on request. Write for it now. Your name and address on a postcard will do.

UNIVERSAL PORTLAND CEMENT CO.
CHICAGO, - - - 208 South La Salle St.
PITTSBURGH, - - - - - Frick Bldg.
MINNEAPOLIS, - Security Bank Bldg.

Plants at Chicago and Pittsburgh
Annual Output 12,000,000 Barrels



SANITARY CLEANLINESS AT A VERY LOW COST

Perhaps you have always thought of sanitary cleanliness as being only a shade better than ordinary soap and water cleanliness, consequently of little value to you, and especially when you thought it cost a great deal more.

But this is not true, for with

Indian in circle



in every package

Wyandotte
Dairyman's
Cleaner and Cleanser

you can have sanitary cleanliness, which you will readily discover to be far superior to soap and water cleanliness, and it will both surprise and please you to find that it costs no more than ordinary cleanliness. Cleaner, fresher, sweeter milk utensils, purer and more wholesome odors everywhere, these are a few of the indications of the better cleaning done by Wyandotte Dairyman's Cleaner and Cleanser. If you are not using Wyandotte Dairyman's Cleaner and Cleanser, you only need to give it a thorough trial to appreciate how much you are sacrificing to be without it. Ask your dealer for a sack or write your dairy supply man for a barrel or keg.

THE J. B. FORD CO., Sole Mfrs., WYANDOTTE, MICH.

This Cleaner has been awarded the highest prize wherever exhibited.

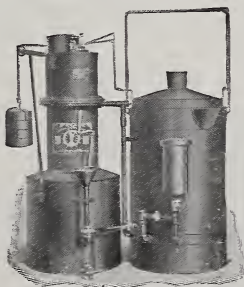
GAS FOR LIGHTING AND COOKING

PILOT LIGHTING PLANTS

SUPPLY A CITY CONVENIENCE TO COUNTRY HOMES

A simple, automatic gas machine, producing the most beautiful light in the world. Cheaper than kerosene. Installed in cellar or outside the house.

**Absolutely Safe
Always Ready**



Handsome, ornamental chandeliers.

Barns lighted by pull of a chain—no matches needed.

Clean and cheap for cooking.

**A Cool Kitchen
in Summer.**

Used today in more than 250,000 Country Homes. Pilot Lighting Plants installed complete, ready for use and guaranteed. Write for estimate.

OXWELD ACETYLENE COMPANY

NEWARK, N. J.

CHICAGO.

LOS ANGELES.

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

MORE THAN EVERLASTING

THE HIGH SILO

When you build your everlasting silo, economize by making it tall. A sixty foot structure will hold twice as much silage as a forty foot one will hold. The increased pressure will result in greater tonnage per unit of space, and in the production of a much better quality of silage. Experts recognize the true economy of the high silo.

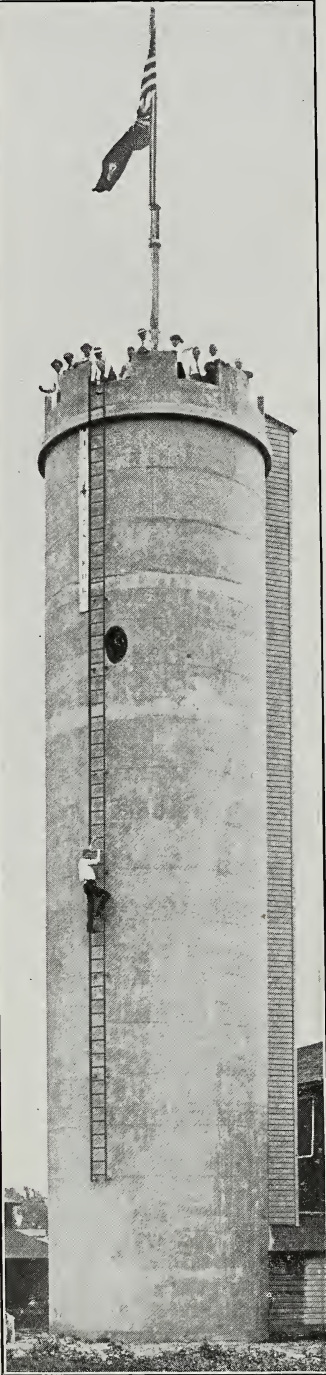
Another thing you should consider when you build your tall, monolithic concrete silo is the construction of a water tank on top. The combined silo and water tank is the very best investment that the American farmer can make today. Good water pressure means good fire protection all over the farm premises. The prospect appeals to the man who wants to do the thing right.

THE POLK SYSTEM

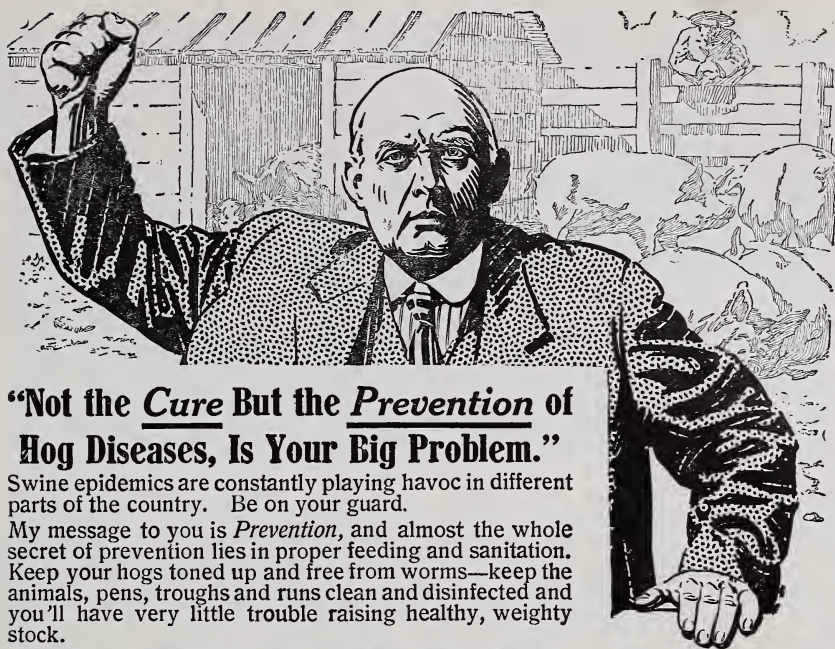
has pioneered for the tall silo and the water tank on top. The security and the reliability of POLK SYSTEM construction have made 70 to 80 foot structures easily obtainable and thoroly dependable. Find out what the POLK SYSTEM has done for silos—then demand a POLK SYSTEM silo.

WRITE

Polk-Genung-Polk Co.
FORT BRANCH, INDIANA.



Silo with Water Tank on Top.
Total Height, 79 Feet.
THE EXPERTS LIKE IT.



"Not the Cure But the Prevention of Hog Diseases, Is Your Big Problem."

Swine epidemics are constantly playing havoc in different parts of the country. Be on your guard.

My message to you is *Prevention*, and almost the whole secret of prevention lies in proper feeding and sanitation. Keep your hogs toned up and free from worms—keep the animals, pens, troughs and runs clean and disinfected and you'll have very little trouble raising healthy, weighty stock.

DR. HESS STOCK TONIC

Makes Stock Healthy and Expels Worms

Dr. Hess Dip and Disinfectant

Destroys Germs—Deodorizes—Cures Skin Diseases

These two preparations are the result of my lifetime experience as a doctor of veterinary science, a doctor of medicine and successful stock raiser. Dr. Hess Stock Tonic will put your animals in a thriving condition, make the ailing ones healthy and expel the worms. Contains *tonics* to aid digestion and appetite; *blood builders* to enrich and tone up the blood; *laxatives* for regulating the bowels and *vermifuges* to expel worms.

Sanitation has been my constant message to you for many, many years, through the agricultural press, as being an absolute necessity for the prevention of disease.

Dr. Hess Dip and Disinfectant destroys disease germs, foul odors, and is an effective remedy for parasitic skin diseases. For cleansing hog-pens, stables, barns, outhouses, sinks, drains, troughs, garbage cans, etc. Put it in the hog wallows, sprinkle it around the poultry houses—use it wherever there are foul odors, filth, lice, scab, sheep ticks, mange, etc. It is non-poisonous and non-irritating; always uniform in strength and one gallon makes 75 to 100 gallons of solution.

So sure am I that Dr. Hess Stock Tonic will put your animals in a thriving condition, make the ailing ones healthy, and expel the worms—that Dr. Hess Dip and Disinfectant will destroy foul odors and disease germs, prevent and cure skin ailments and keep your premises clean and sweet smelling—that I have authorized my dealer in your town to supply you with enough for your stock, and if these preparations do not do as I claim, return the empty packages and my dealer will refund your money.

The above dependable and scientific preparations are never peddled—sold only by reputable dealers whom you know. I save you peddler's wagon, team and travelling expenses, as these prices prove: Dr. Hess Stock Tonic, 25-lb. pail, \$1.60; 100-lb. sack, \$5.00; smaller packages as low as 50c (except in Canada and the extreme West and South). Dr. Hess Dip and Disinfectant is sold in pint bottles, quart and gallon cans, also in barrels.

I have a book about Dr. Hess Stock Tonic and Dr. Hess Dip and Disinfectant that you may have for the asking.

DR. HESS & CLARK,

GILBERT HESS
Doctor of
Veterinary Science
Doctor of Medicine

Dr. Hess Poultry Pan-a-ce-a

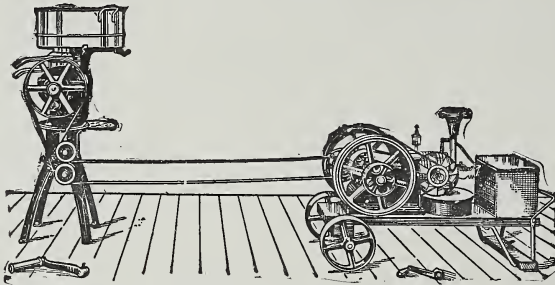
A splendid poultry tonic that shortens the moulting period. It gives the moulting hen vitality to force out the old quills, grow new feathers and get back on the job laying eggs all winter. It tones up the dormant egg organs and makes hens lay. Also helps chicks grow. Economical to use—a penny's worth is enough for 30 fowl per day. 1½ lbs. 25c; 5 lbs. 60c; 25-lb. pail \$2.50. Except in Canada and the far West. Guaranteed.

Dr. Hess Instant Louse Killer

Kills lice on poultry and all farm stock. Dust the hens and chicks with it, sprinkle it on the roosts, in the cracks and dust bath. Also destroys bugs on cucumber, squash and melon vines, cabbage worms, etc., slugs on rose bushes, etc. Comes in handy sifting-top cans. 1 lb. 25c; 3 lbs. 60c. Except in Canada and the far West. I guarantee it.

Ashland, Ohio

International Harvester Cream Separators



THERE is money enough in the one advantage of the saving in cream and butter fat, to pay for a cream separator the first year. This is specially true if you buy a close skimming, durable International Harvester cream separator—Lily, Bluebell, Primrose or Dairymaid—which leaves less than a drop of cream in each gallon of milk.

These separators have all the points which make cream separators good. They have the balanced bowl, the self-adjusting neck bearing, the tool steel spindles, the bronze bushings, the spiral gears, the low supply can, the high skim milk spout, and the open, sanitary base, without which no separator can be satisfactory.

Some dealer near you handles I H C separators. If you do not know, write us and we will tell you who he is. We will also send you our cream separator catalogue which tells you why it pays so well to buy an I H C separator.

The I H C Line

GRAIN AND HAY MACHINES

Binders, Reapers
Headers, Mowers
Rakes, Stackers
Hay Loaders
Hay Presses

CORN MACHINES

Planters, Pickers
Binders, Cultivators
Ensilage Cutters
Shellers, Shredders

TILLAGE

Peg, Spring-Tooth,
and Disk Harrows
Cultivators

GENERAL LINE

Oil and Gas Engines
Oil Tractors
Manure Spreaders
Cream Separators
Farm Wagons
Motor Trucks
Thrashers
Grain Drills
Feed Grinders
Knife Grinders
Binder Twine

International Harvester Company of America

(Incorporated)

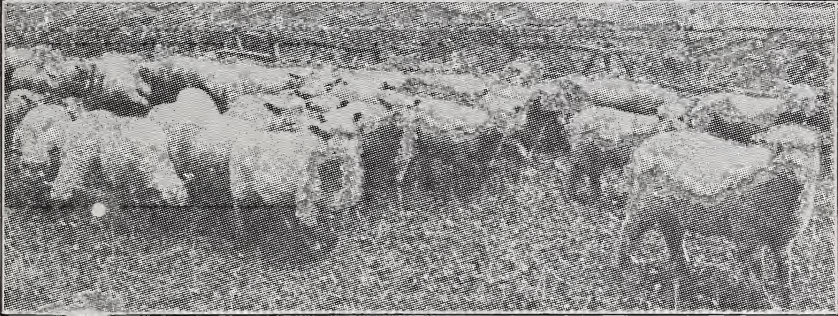
CHICAGO

USA

Champion Deering McCormick Milwaukee Osborne Plano



Sheep Thrive Better



(206)

While it is true that no known treatment or remedy will dislodge all the different kinds of worms that infest sheep, it is nevertheless true that SAL-VET will keep sheep in condition to thrive better, and saves hundreds that would otherwise succumb to the multiplying hordes of stomach and intestinal worms.

Mr. J. H. Leet, of Chas. Leet & Sons, Mantua, Ohio, writes: "We consider SAL-VET the salvation of the sheep in America, and we recommend its constant use to our customers, as well as to others." Mr. Henry L. Wardwell, Springfield Center, N. Y., says of SAL-VET: "We have used SAL-VET as a preventive of worms in our flock of sheep, and have great faith in it. We keep it before them all the time, both when on pasture and when in the barn."

**The Great
Worm
Destroyer**



**The Great
Live Stock
Conditioner**

is highly endorsed by nearly all sheep breeders and by thousands of general farmers and stock raisers. I guarantee SAL-VET to stop your losses from stomach and free intestinal worms or no pay—I take all the risk—let you feed it 60 days to prove my claims. You cannot afford to pass this offer by if you own or feed stock with the intention of making a profit from them.

Just Fill Out the Coupon



**Look for
This Label**
on all SAL-
VET Packages.
Don't be de-
ceived by imi-
tations.

Don't buy "Sal" this or "Sal" that. Get the original genuine SAL-VET.

Prices	
40 lbs.,	\$ 2.25
100 lbs.,	5.00
200 lbs.,	9.00
300 lbs.,	13.00
500 lbs.,	21.12

No orders filled for less than 40 lbs. on this 60 trial offer. Never sold in bulk; only in Trade-Marked SAL-VET packages. Shipments for 60 days' trial are based on 1 lb. of Sal-vet for each sheep or hog, and 4 lbs. for each horse or head of cattle, as near as we can come without breaking regular-sized packages.

Tell me how many head of stock you have and I'll ship you enough SAL-VET—no money down—to feed your stock for 60 days. Simply pay the freight charges on arrival—feed the SAL-VET as directed. If it does not do all I claim I'll cancel the charge and you won't owe me one cent.

SIDNEY R. FEIL, Pres.

THE S. R. FEIL CO.

Manufacturing Chemists

Dept. AS CLEVELAND, OHIO

Sidney R. Feil, Pres.

THE S. R. FEIL CO.

Dept. AG-S

Cleveland, Ohio

Ship me enough SAL-VET to last my stock 60 days. I will pay the freight when it arrives, agree to report results promptly in 60 days, and at that time pay for it if it does what you claim. If it does not, you are to cancel the charge.

Name.....

P. O.

Shipping Sta.

State.....

Sheep..... Hogs.....

Cattle..... Horses.....



If these melons bring an average price of 75c apiece on Broadway, why can't you get in on some of the profits?

Make Money Winters Growing Greenhouse Vegetables

Did it ever occur to you that the same men who work for you outside in the Summer could just as well work inside Winters if you had a greenhouse?

Have you ever thought of it as a solution of your labor problem? Isn't it so, that a man who is reasonably sure he has a job **the year around**, works better and becomes a more valuable man each year? Isn't "the short job man" the one you have the most trouble with? If you have a thousand or so dollars to invest, why don't you try your hand at raising greenhouse lettuce, tomatoes and cucumbers? Start

with a small house and work up into something bigger. You may find it pays better than farming. It's worth looking into. We would be glad to answer your questions and give you an approximate cost on a vegetable house.

We have been building greenhouses for over half a century, and it stands to reason that we know how best to build them.

Send for our Commercial Greenhouse Catalog.

Lord & Burnham Co.

SALES OFFICES:

New York,
42 nd St. Building.
Chicago,
Rookery Building.

Boston,
Tremont Building.
Rochester,
Granite Building.

Toronto, 12 Queen St. East.

Philadelphia,
Franklin Bank Building.
Cleveland,
Swetland Building.

FACTORIES:

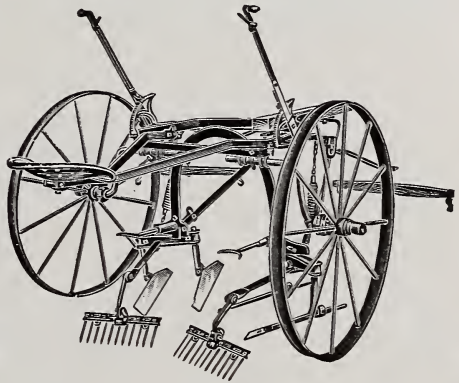
Irvington, N. Y.

Des Plaines, Ill.

Results Are What Count!

W. G. & L. S. Griffith, of McNabb, Ill., breeders of Reid's Yellow Dent and Griffith's Early Dent Corn, wrote us on Feb. 16, 1914, as follows:

"Three years ago we tried a Tower and since have discarded all other makes in favor of the Tower. We find for early cultivation we can do better and faster work than with other cultivators. For the season's cultivating they have proven the best means of keeping the field in proper condition. Towers are a sure means of saving corn roots and conserving moisture."



Messrs. Griffith won the Grand Champion Prize at the State Corn Show in 1912. In 1913 their seedhouse burned, and that year John W. Rapp, of LaMoille, Ill., an exclusive Tower user for twenty years, won the Champion Sweepstakes and First Prize for the Northern Division.

In 1914 Mr. Griffith was again the winner of these prizes. Results like these prove our claims.

For Particulars, See Dealer
or Write



THE
**J. D. Tower
& Sons Co.**
MENDOTA, ILLINOIS.

The Farm Operators Exchange Bureau

The Farm Operators Exchange Bureau was established by the Agricultural College early in the year 1913. Its purpose is to classify the numerous inquiries received, and to put persons wishing positions as farm operators, on a salary or share basis, in touch with those who desire to employ men on such terms. In order to carry on this work it was necessary to provide for five classes of applicants, viz:

- (1) Those desiring positions as Farm Managers;
- (2) Those desiring to lease farms;
- (3) Those desiring to hire a Farm Manager;
- (4) Those having farms to rent for cash;
- (5) Those having farms to rent for a share.

General information concerning the applicant or the farm is secured and filed. No names are filed until such information is received on the regular form provided for it. Inquiries are always compared with the names on file whenever received, and names are exchanged whenever they seem to compare favorably on the more important points.

This service is given free of charge and names are furnished without recommendation. Not more than three names will be furnished at any one time, but more will be furnished when requested if they are available.

Address all communications to THOS. D. PHILLIPS, Supt.,

Farm Operators Exchange Bureau,

Townshend Hall, O. S. U.

Wanted Position as Farm Manager

- No. 221—Unmarried man, 23 yrs. of age. Raised on a farm. High School education and 2 yrs. in Agricultural College.
- No. 223—Married man, 33 yrs. of age. A graduate of Ohio Agricultural College. Seven years' experience in managing a farm and breeding Holsteins.
- No. 136—Married man, 32 yrs. of age. Life time on a farm and four years in Agricultural College.
- No. 180—Unmarried man, 25 yrs. of age. High School education and 2 yrs. in Agricultural College; 14 yrs. on a dairy farm since 11 years of age.
- No. 92—Married man, 45 yrs. of age. Life time experience on a farm. Has done some newspaper work.

Wanted to Lease a Farm

- No. 143—Married man, 29 yrs. of age. Can equip a farm of 150 to 300 acres for general farming.
- No. 217—Married man, 44 yrs. of age. Lived 39 yrs. on farm. Would lease from 50 to 200 acres on shares.
- No. 30—Married man, 44 yrs. of age, would lease 180 acres in Fairfield, Licking, Franklin, or Pickaway Counties on share basis.

Wanted to Hire a Manager

- No. 220—For 70 acre farm, 1½ miles from Tarentum, Pa. Good buildings. Will pay a monthly guarantee and share all above operating cost.

Farms for Lease, Cash or Share

- No. 130—150 acres 12 miles from Cleveland; 24 acres in grapes. Good trucking location. Good house and barn. Will consider any fair proposition.
- No. 145—177 acres, 7 miles from Coshocton. Good limestone soil. Fair buildings. Limestone quarry and railroad spur on farm. Will lease on half share basis.
- No. 216—125 acres, 13 miles east of Cincinnati, O. Good buildings and very little waste land. Soil very fertile. Prefer to rent on share basis.
- No. 217—186 acres, 13 miles east of Zanesville, O. Limestone and clay soil. Good buildings and live stock. Will rent on half share basis.
- No. 218—220 acres, 5 miles from Cambridge, O. Can be divided into two tracts. Will rent either or both for cash or share.
- No. 224—84 acres, ½ mile from Groveport, Franklin Co., O. Level land and good buildings. Will rent for cash.



CONTENTS

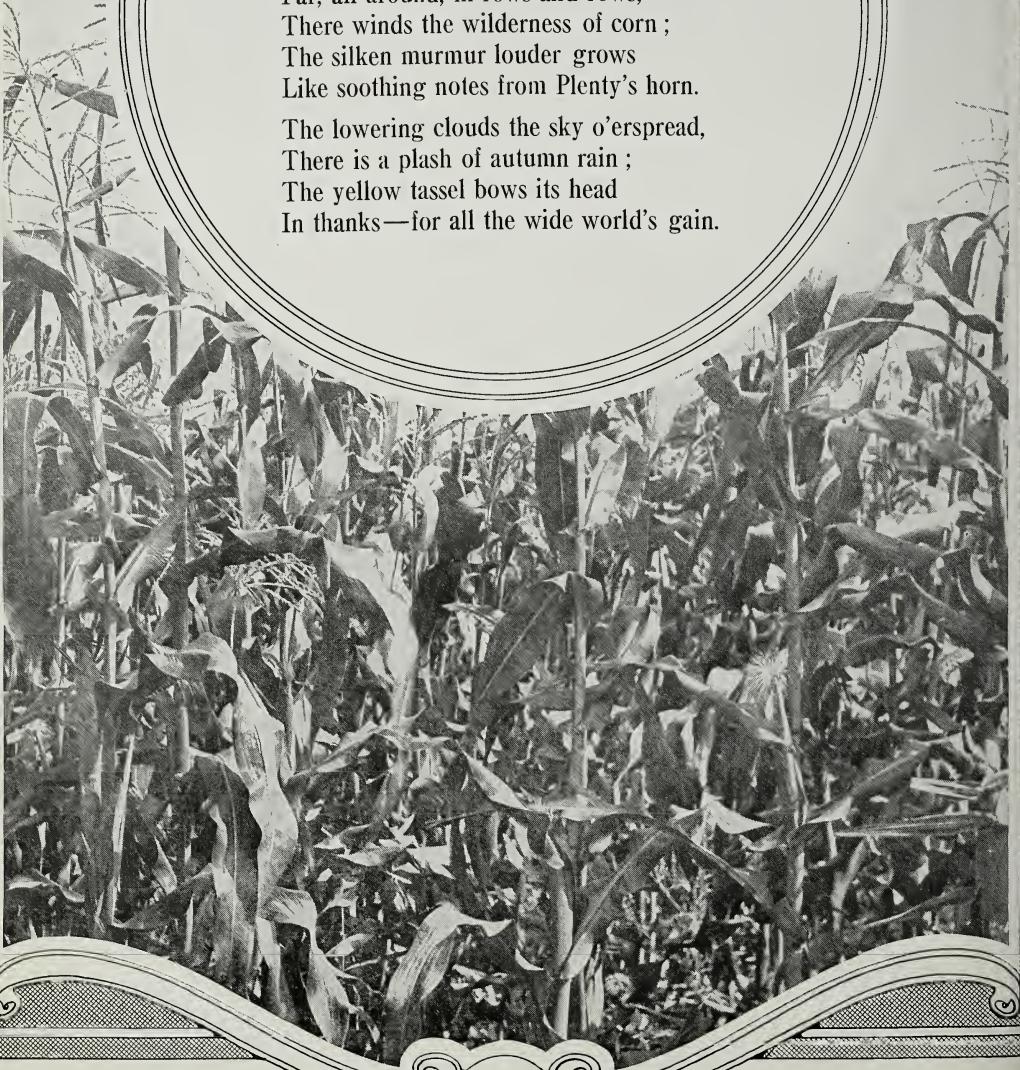
	Page
FRONTISPIECE—Courtesy I. H. C.	
THE CROP SURVEY—	
Prof. E. G. Montgomery	179
GROWING SILAGE CORN—	
Prof. Oscar Erf	181
FIELD CROPS IMPROVEMENT IN SWEDEN AND DENMARK—	
Prof. George Livingston.....	184
COMBATING CORN PESTS—	
Prof. P. G. Holden.....	187
ALFALFA ON WOODLAND FARM—	
Joseph E. Wing	189
GOOD WORKMANSHIP IN AGRONOMIC LITERATURE—	
C. R. Ball	192
THE ADSUKI BEAN—	
W. J. Morse	195
LEGUME INOCULATION—	
T. W. Yocum.....	197
SELECTION AS A MEANS OF IMPROVEMENT—	
F. A. Welton	201
PREPARATION OF THE SEED BED FOR WHEAT—	
W. F. Brown	204
ADVANCEMENT IN AGRICULTURE—	
L. C. McClung	206
FERTILIZER FOR THE WHEAT CROP—	
Stanley Sink	208
NATIONAL DAIRY SHOW—THE MAKING OF A WINNING TEAM—	
L. L. Rummell	211
EDITORIALS	215
DEPARTMENTS	219-231

The Corn Field

The wind blows drowsing from the east,
A sound of quaking leaves is heard,
There lows some far off drowsing beast
And softly twits some flitting bird.

Far, all around, in rows and rows,
There winds the wilderness of corn ;
The silken murmur louder grows
Like soothing notes from Plenty's horn.

The lowering clouds the sky o'erspread,
There is a plash of autumn rain ;
The yellow tassel bows its head
In thanks—for all the wide world's gain.



THE AGRICULTURAL STUDENT

Vol. XXI.

OHIO STATE UNIVERSITY, COLUMBUS, NOVEMBER, 1914

No. 3

THE CROP SURVEY

PROF. E. G. MONTGOMERY

Cornell University

JUST now the survey idea is broad in the land. We are having orchard surveys, farm management surveys, social and church surveys and, naturally, it seems to be in order to have crop surveys.

While all farm management surveys include more or less about crops, there is a distinction between a crop survey and a farm management survey. In a farm management survey not only crops are included but live stock, buildings and equipment and it is largely to determine what type of farming is best. So far as it touches on crops, the question asked by the farm management survey is "When shall we grow a certain crop, and how much?" while in a farm crops survey we are not so much concerned with when the crop shall be grown or whether it shall be grown at all by a particular farmer, but the question we are concerned in finding out the answer to is "How is the crop grown?" If we apply these questions to their situation, "When shall we grow the crop?" and "How shall we grow the Crop?" it will give us the distinction between a farm management survey and a farm crops survey.

The method to be pursued in a farm crops survey will vary with conditions. The main point, as I take it, is to find out what methods the farmers are using in the production of a certain crop in a given region, and which method appears to be the best and most practica-

ble. Then if the general methods differ in various parts of the state, we want to find out why they differ and whether it is based on different climatic or soil conditions or different market demands.

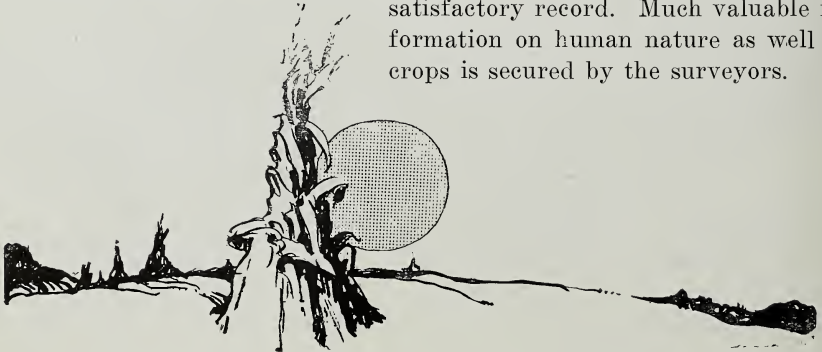
For the past two years we have been making a survey of potato production in New York state and have covered the four principal potato growing sections of the state. Each of these sections seems to have its own method and its own particular problems. Much valuable information has been uncovered. Nearly all of the various theories have been thoroughly tested out by farmers here and there and their experience with the different methods is valuable. For example, all the different kinds of spraying mixtures and methods of applying and different kinds of spraying machines have been thoroughly tested. Their practical experience is probably worth more than any information based on experimental work that can be carried out by an experiment station.

We also found that there was no such thing as a universal method for doing things. For, example on the north side of Long Island the spraying of potatoes is not practiced to any great extent, while on the southern part of the Island, it is universal. This is due to the fact that there seems to be little or no late blight on the north side. We also found a large potato

growing region near the foot hills of the Adirondacks where spraying is not practiced and late blight is practically unknown. These facts were not clearly known until we made the survey. It is only by some such systematic method as this that we can come to know these conditions. After the survey is completed a man going into a region to discuss some problem, such as spraying, will have definite information as to whether spraying has been found profitable in that region or not. The same information is found in regard to the details in connection with potato production. In some places a very marked relation exists between the type of soil and the distribution of the crop. This is something not shown in the government statistics. For example, in a certain county which is half one type of soil and half another, it is shown that practically all potatoes produced are grown on the one type. This cannot be known by consulting the statistics for that county, because in that case, yield of potatoes for the whole county is given, and while statistics show it to be a county that produces an enormous crop of potatoes, it would not be safe to advise farmers to grow potatoes as a main crop on more than half of the land in the county. It is also a fact that no one seemed to know this until the survey had shown the exact location of these farms with

the soil survey. The soil survey ought to precede a crop survey as this furnishes not only the soil areas but an excellent map to use in making a crop survey. I believe that a crop survey ought to precede investigation of a crop for two reasons: First, many of the important fundamental facts have already been worked out by farmers in a satisfactory way and further experimental work is not needed on this point. In the second place, without some such survey the experimenter is very likely to miss the problems that are of most concern to the grower. It is not necessary that experimental work always limits itself to those problems that are of greatest concern to the grower. If the experimenter desires to work out a farmer's problem one of the best ways to find the problem is to make a survey and obtain from the grower himself, information as to the problems that are giving the most trouble.

The detailed work up to the present has been done by graduate students and seniors. After a region has been selected for the survey, every farmer growing more than 5 acres of potatoes is interviewed. On an average one man can secure 4 or 5 records a day. All kinds of men must be interviewed and it often takes much diplomacy and good judgment as to how accurate the answers are, to secure a satisfactory record. Much valuable information on human nature as well as crops is secured by the surveyors.



GROWING SILAGE CORN

PROF. OSCAR ERF
Ohio State University

ON account of the increased number of silos in the state, the problem of growing silage corn becomes an important problem in the farm operations. As near as can be estimated about 1600 extra silos have been built the past year in this state. This is only an approximate figure, judging from the sales from the various concerns.

good silage corn seed for there are years when early frost prevents the silage corn from becoming mature. However, this autumn has been exceptional in maturing silage corn. This corn always matures in the southern states, and the seed can be purchased from southern growers. Care should be taken that these are purchased from



SOY BEANS WITH CORN MAKE A GOOD COMBINATION OF CROPS FOR SILAGE.

About the first factor that needs to be considered in silo work is the kind of corn to plant. Some use the so-called silage corn, while others use the common field corn. For practical operations, the best corn to plant is the regular silage corn, for it has been well demonstrated that this yields more dry matter per acre than common field corn, providing the silage corn is grown under equal conditions.

It is sometimes difficult to secure

reliable people in order to get a good corn. It is for this reason that sometimes silage corn does not yield as much as some of our good field corn. The silage corn usually grows much taller, and often has from three to four immature ears on the stock and for that reason the nutrients are distributed more thoroughly through the stock than field corn at the time the silo should be filled.

The best proof of the yield of silage

corn is illustrated in a table which is published in one of the bulletins of the Ohio Experiment Station, which shows the difference in production between silage corn and field corn.

Year.	Tons of Corn Per Acre.	
	Blue Ridge	Field
1913	12.55	8.43
1912	20.71	11.48
1911	15.52	12.22
1910	7.78	5.09
1909	15.82	10.46
1908	12.80	7.30
1907	15.42	10.55
1906	15.25	10.57
1905	15.25	11.60
1904	15.86	16.45
10 Year Average.....	14.79	10.41

However, it is not always amiss to grow common field corn for the silo. Common field corn usually has a greater proportion of ear to stock, and in case of feeding high producing cows, where especial care is taken in selecting silage which is very rich in corn grain, it is very desirable. It is sometimes convenient to use common field corn, but for the average producing dairy, it is not so profitable as growing silage corn, for it is bulk and succulency that the average dairy cow needs when fed concentrates for economical milk production.

The best kind of soil in which to raise corn is a clay loam, preferably mixed with a little sand. This land, if well tilled, and well manured previously, so that the manure is decomposed, and so that it is well distributed, will make an excellent soil. If, however, the land is to be prepared during the winter, at least ten to fifteen tons of well rotted manure per acre, put on early in winter, or late in fall, and ploughed under makes an excellent soil condition.

Strawy manure is not as good as

well rotted manure for immediate use. However, if the strawy manure is put on the previous year, it would serve the purpose just as well. Strawy manure is also objectionable, especially if it is brought in from other places, and not produced on the farm, on account of the weed seed that is distributed, which becomes a nuisance and requires considerable work to keep the corn clean. Manure should, therefore, lie in a pit or a pile during the summer months so that the fermentation will thoroughly kill all the weed seed before it is put on the land. The loss of fertilizing value is often not nearly as great as the extra labor of removing the weeds from the corn, especially in the early wet season. Manure is much better than commercial fertilizer, owing to the fact that the humus plays a very important part in the development of the corn as the humus provides moisture which is readily available, and in the most desirable condition for the corn plant. Fertilizer should be added gradually, and in small doses through the season. It is best to fertilize when the corn is cultivated, using, of course, a small amount at the time of planting.

The soil should be thoroughly disked and pulverized in the spring, and planted early as the weather and soil conditions permit. Silage corn may be, and in fact should be, planted reasonably thick, in rows approximately two feet and three inches, and narrower if it will not prevent the use of the cultivator. The cultivator will more or less regulate the distance of your planting, but good soil will stand heavy planting, and will give an excellent yield if the corn is properly cultivated and the moisture is abundant. Corn may be planted from four to six inches in the row. To demonstrate the ad-

vantage of having corn planted by dropping the kernel in the row, a table of the Ohio Experiment Station shows some very interesting results. .

Kernels dropped every:	Tons of Corn per Acre					
	1913.	1912.	1911.	1910.	1909.	5 Year Ave.
4 in..	13.47	21.25	14.88	9.57	19.53	15.74
6 in..	13.87	19.68	15.10	9.18	13.53	14.27
10 in..	13.18	17.20	14.68	8.50	14.11	13.53
12 in.	12.73	16.17	13.78	8.53	13.15	12.87

ents. However, if frosts come early, corn for silage purposes should never be allowed to stand for very long after frost, without adding water at the time of filling the silo.

When the lower leaves begin to dry up, and when the corn is ready to put in shock has proven to be the best time to put up corn for the silo. Green corn always makes sour silage, and there is a greater loss by decomposition than in the case of a well matured



DIFFERENCE IN SILAGE CORN (Left) AND FIELD CORN (Right).

Frequent cultivations, and cultivations taking place soon after rains in order to prevent evaporation from the soil is necessary for the development of the big corn if planted close.

It is ordinarily suggested that the best time to harvest the corn is when the kernel is in the doughy stage, or in the case of field corn, when it begins to dent. The time for putting up silage corn depends a great deal upon the weather conditions. As long as there is no frost, it is wise to let the corn stand and mature as long as possible to get the greatest amount of fodder with the greatest amount of nutri-

crop. Therefore, if the corn has to be removed early for the sake of planting another crop and the silage corn is green, it would be better to shock the corn for a few days before it is put into the silo.

If silage corn is too dry, water may be added by allowing it to flow into the blower at the time of putting up silage and a larger amount of water should be added to the top half of the silo than to the bottom half, so that the moisture would permeate to the lower strata as it gradually seeps down, and at the same time gives weight, causing it to settle rapidly.

FIELD CROPS IMPROVEMENT IN SWEDEN AND DENMARK

GEORGE LIVINGSTON

Agronomy Department, Ohio State University

THERE is no phase of field crops work more interesting to the investigator or more important to the producer than that of crop improvement. The improvement of animals has long been practiced but the belief that plants can actually be changed to improve their usefulness is a more modern conception. While much progress in this field of crop production has been made in the United States, more extended scientific investigations and

distribution of seeds of new and improved varieties of higher yielding and better quality of agricultural plants. For some time the enterprise was a co-operative one but in recent years the Swedish government has supported the work quite generously. There are two branches to the business, the productive and the distributive sides. The productive phase of the work has to do with the development of superior strains or varieties through scientific



POTATO INVESTIGATION AT LANDSKROUA, SWEDEN. NOTE THE VARIATION IN DISEASE RESISTANCE.

more results of scientific and practical worth have been achieved by field crops investigators in Europe.

Perhaps the most noted example of successful crop improvement is that resulting from the work which has been carried on by the Swedish Seed Association at Svalöf, where the writer visited for a few days this summer, in company with Professors Love and Montgomery of Cornell University. This association was organized in 1886 by a few progressive land owners and had for its object the production and

methods of selection and hybridization. This branch of the business is in charge of a staff of thoroughly trained scientists, each a specialist in his own field to which he devotes his entire time and attention. Dr. Nilsson-Ehle, in charge of wheat and oats investigations, is one of the best known, and one of the most highly regarded plant breeders in the world. He impresses one as being rather young to have attained the reputation which he now enjoys. In his work at Svalöf he has not only produced higher yield-

ing strains and made great progress in the development of rust resistant and stiff strawed varieties, but he has also made invaluable contributions to the science of genetics. His scientific publications have appeared in four languages all of which he speaks quite fluently and reads and writes with remarkable clearness. We found him to be most friendly and he spared neither time nor trouble in showing us around his fields and acquainting us with the work which he is doing.

Some of the strains of wheat devel-

logue for 1914-1915 lists for the first time new types of timothy and orchard grasses.

At Landskroma scarcely a half hour's ride from Svalöf is another well known Swedish Seed Company, a private institution that has developed into a strong competitor of the Svalöf station. The experimental grounds of this company are also in charge of a staff of thoroughly trained scientists, almost all of them with Ph. D. degrees who have nothing to do with routine work or the business side of



PROF. LOVE AND DR. W. JOHANNSEN.

In the Background is the Bird Proof Cage in Which Dr. Johannsen Carried on His "Pure-line" Investigations.

oped by Dr. Nilsson-Ehle have given an increased yield of 25% above that of the common sorts. Similar results, although not quite so striking, have been obtained with oats, barley, and peas. In recent years the work has been extended to clover, forage grasses, potatoes, sugar beets and other root crops. The work with these crops has not yet been in progress long enough to place on the market, seed of the new sorts. No new varieties or strains are placed on the market until they have been grown and tested on the station farm for several years. The new cata-

the enterprise but who devote their entire time to scientific investigation.

From this station there has appeared on the market some fine varieties of wheat, rye, oats and forage grasses. Potato investigation is here given much attention and some strains are being developed that give promise of being superior to anything yet found for that country.

Comparatively little work has been done toward the development of better sorts of legumes and forage grasses. Perhaps the most extended investigation in this direction is being done by

Director Lindhard at Tystobte, Denmark. Here one sees many experiments with blue grasses, orchard grass, timothy, clovers and alfalfa. New types have been developed by selection and hybridization that are better adapted to that country and yield better than the old sort.

At Copenhagen, Dr. Love and I had the pleasure of being entertained at the home of Dr. Johannsen, professor of plant physiology in the University of Copenhagen. In addition to being a scientist of world wide fame, we found him to be a royal host and a jolly good fellow. The first thing he did was to decorate Dr. Love with a Cornell pennant and me with an Ohio State one,

which he had collected on one of his tours through this country, hang an American flag on the chandelier and then call Mrs. Johannsen to view the handsome effect. He took great delight in showing us around his experimental garden and especially the place where he is carrying on his famous "pure line" investigations.

When one visits these stations, looks over the experiments being carried on, talks personally with the investigators about the progress they have made and the ends which they hope to attain, one can scarcely fail to see the great possibilities in this line of work in our own country.



AWAITING THANKSGIVING DAY.

COMBATING CORN PESTS

PROF. P. G. HOLDEN

Director of Agricultural Extension Department, International Harvester Company

ROTATION of crops is the most practical and powerful means of combating insect enemies of corn. When insect enemies have taken possession of our corn fields there is no immediate remedy. It is most fortunate, indeed, that the system of rotation which gives the most profitable return from each acre under normal conditions in the corn belt, is also the system which will most successfully combat these enemies.

Continuous culture of the same crop is vicious. It means poor soil, and consequently poor crops, and favorable conditions for the development of the insect and fungus enemies peculiar to the corn crop. In making a careful study of the conditions throughout the corn belt recently, it was very apparent: First, that little or no damage was being done to the corn crop by insect enemies where the farmer practiced a good system of rotation of crops. Second, that corn grown continuously on the same ground was almost always seriously damaged by the corn root worm, and generally by the corn root louse. Third, that where pasture and especially meadow ground is left down for more than two years it becomes the breeding place for white grubs, bill-bugs, stalk-borers, cut worms, wire worms and web worms.

It is a common thing to find grass in old meadows and pastures so weakened in large spots by these insects, that the wild barley or squirrel tail and other weeds come in and take possession of the ground. The presence of the squirrel tail is generally the direct result of some or all of these insects.

The white grub and wire worm are frequently worse on second sod. This

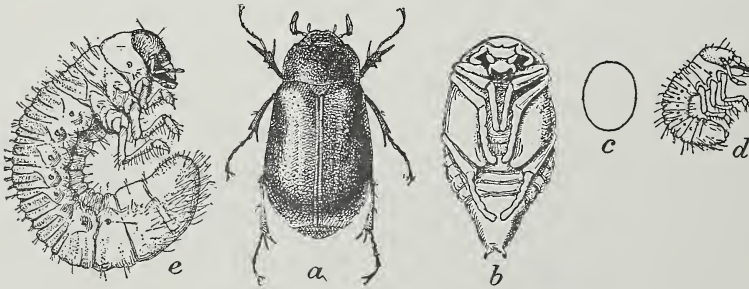
is due to the fact that there is generally some grass in the field the first year, upon which the insects subsist, but, by the second year it is entirely killed out and they have only the corn to live upon. The wire worms and the white grubs remain in the ground two or three years before changing into beetles, the former becoming June bugs or May beetles, the latter becoming click or snapping beetles. The cut worms live but one year, and do their chief damage on the first year of sod corn.

Next to poor seed, the corn root worm is the greatest source of loss to the corn crop. The loss varies in different fields from a few bushels per acre to almost the entire destruction of the crop. The work of the corn root worm is not limited to any particular section, but is general throughout the corn belt. The root worm is so very small and does its work unobserved in the roots of the corn so gradually that few people have any knowledge of the insect or the loss it causes annually. Eggs are laid mostly during August and the first part of September and hatch the following June or July. When full grown the worm is about one-third of an inch in length and as large around as a pin. As soon as hatched the worm enters the root of the corn and burrows back and forth. Sometimes five or six worms will be found in one root. The roots thus affected will finally die and rot off, leaving short stubs. The stalk of corn is thus deprived of moisture and nourishment. Generally the worm reaches its full size by August, when it pupates and in a few days comes out as a small beetle, light colored at first, but soon

turning to a grass green. They scatter throughout the field and migrate to other corn fields, feeding on the silks and the corn at the tips of the ears. So far as is known, the corn root worms work only on the roots of corn and it is almost certain that the eggs are always laid in the corn field.

Indications of the presence of root worms are: First, the corn will have an uneven appearance, certain patches being especially poor and making a slow growth during the latter part of June and early July. The corn will have a yellow, sickly appearance and seem to "stand still." Second, the presence of the worm itself, which can be determin-

head of a pin, blue green in color and appear in cluster on the roots. They are always found associated with ants which act as guardians protecting them and carrying them to the roots of the corn. The lice pierce the roots with sharp beaks and suck the juices which should go to build up the plant. They exude a sweetish substance (honeydew) upon which the ants feed. The greatest damage is done when the corn is small. The lice often attack the root as soon as the corn sprouts and kill the plant before it comes up. The indications of lice are: (1) The presence of ants in the corn field with ant holes in the hills of corn. (2) A slow growth of



MAY BEETLE.

(a) Beetle, (b) Pupa, (c) Egg, (d) Newly hatched larva, (e) Full grown larva or white grub.

ed by breaking open the roots. Third, the appearance of the roots. When one root has been destroyed the worm attacks another; principal roots and the brace roots are often completely destroyed and others have a dark appearance, which, when split open show the burrow of the worms, although it may have left the root sometime before. Fourth, the falling down of the corn during the latter part of July and August, especially in those spots most affected, after a rain and wind. Fifth, firing of the corn during dry weather.

Next to the corn root worm the root louse probably causes more loss each year to the corn crop than any other corn pest. They are smaller than the

corn when it is small, in spots through the field the corn having a sickly yellowish appearance. Where they are particularly bad the corn will have a purple tinge towards the tip of the leaves. (3) The corn is held back so that it matures late in the fall, often being caught by the frost. The yield is always reduced and the quality poor.

The remedy is: (1) rotation of crops; (2) clean cultivation in the low places; (3) harrowing the ground before the corn comes up and when the corn is small; (4) manuring the ground which gives a vigorous growth and enables the corn to stand the drain made upon it by the lice, root worms and other pests.

ALFALFA ON WOODLAND FARM

JOSEPH E. WING, Mechanicsburg, Ohio

ALFALFA growing has passed with me through several stages in Ohio. There was the year of 1886 in which we sowed the first alfalfa seed on Woodland Farm. It was a small sowing and the little plot did not amount to much, but it gave us the hope that alfalfa could be grown if we could master the conditions. In 1900 we sowed

or due to the wrong treatment of the crop after it had begun to grow. In 1901 we sowed again and learned the need of good drainage. Then we called a halt for a time to our alfalfa sowing on Woodland farm until we could put in more tiles and get on more manure. Each year, however, we managed to find some small area of the



FIELD OF ALFALFA ON WOODLAND FARM.

the first field on Woodland farm and that succeeded, by pure luck and accident, because we managed to get it on land full of limestone pebbles, rich from having been fed on, and naturally inoculated, perhaps, because our father had grown sweet clover not far away. At that time there were many men who had sown fields of alfalfa in Ohio, and so far as I know, all had failed. Their failures as I see it now were because of the lack of limestone, or inoculation,

farm that could take alfalfa and we sowed in patches, meanwhile getting ready for alfalfa in a larger and more business-like way.

In 1906 we sowed about 40 acres, the most daring thing attempted up to that time and as the land had drainage, manure and limestone the alfalfa grew well. After that we steadily increased our acreage and other men all over western and southwestern Ohio began to sow alfalfa in a commercial way. A

year later we had a field of alfalfa that was a fine stand but it did not make a strong growth. Meanwhile it was badly choked with foxtail and other annual grasses. Then it was that acting on advice we harrowed some of the least productive alfalfa and sowed on it acid phosphate. The effect was startling for the crop was quadrupled and the grasses suppressed. After that time we began more or less regularly to use phosphate on our alfalfa fields although we were set back a little by stopping to test the raw rock phosphates, three car loads of which we applied before we learned that on our soil, rock phosphate did not give much effect on alfalfa. In 1911 we tested strips of alfalfa with acid phosphate and basic slag over land that had been previously treated with rock phosphate, and seemed to get as marked effect as if no fertilizer had been given. We calculated that gain from the readily available forms of phosphorus and found that they averaged about 300 per cent. That with us marked the time when we began to understand alfalfa growing and to see a way to grow it easily, surely, and to make alfalfa fields permanent.

In 1912 we sowed 75 acres of alfalfa giving a little more than 3 pounds of basic slag to the square rod to one field, and the same amount of acid phosphate to another field. On some parts of the land that were of a light peaty nature we added 100 pounds of muriate of potash. This 75 acre field resulted gloriously and remains today in perfect health and vigor. We have since top dressed it with 2 pounds of the square rod of slag (or acid phosphate on one part) and $\frac{3}{4}$ pound of muriate of potash. This year that 75 acres yielded in spite of the severe drouth, 300 tons of hay and is today

more than a foot high and a picture of glorious health. It has had no cultivation and needs none for the annual grasses are fully suppressed by the luxuriant growth.

We finally arrived at some very definite conclusions concerning alfalfa growing. First, that it is the easiest plant to grow that we had tried except, possibly, Kentucky bluegrass. Of course its needs must be supplied—that may be lime, drainage, manure underneath the soil, phosphorus, or all of these, but when once the soil has been sweetened and fed alfalfa does best.

We learn that alfalfa is the cheapest thing we can produce. The 4 tons of alfalfa produced this year would equal in feeding value more than 140 bushels of corn to the acre. As a matter of fact the dry year made our corn crop below 70 bushels to the acre, so the alfalfa with no cost of seeding or cultivation yielded us more than double what the corn did. We begin to see a great light. We have now about 150 acres in alfalfa—we ought to have more and no doubt we will have more. Let the other fellows plow and grow the corn, we for the green meadows of alfalfa with their lessened cost of production and their absolute assurance of a harvest.

Now the vital facts need to be known to make alfalfa a glorious success in Ohio are all known and here they are. Good under-drainage with the tiles laid deeply or else on land drained naturally. Next that the land must have plenty of limestone in it. The best form of lime is doubtless the unburned ground limestone. If you live off of the limestone gravels of the western part of the state lime well before seeding to alfalfa. Fifty to one hundred pounds of raw ground limestone to the square rod makes an efficient liming.

Get under the soil some organic matter, manure preferably. This is essential if you want to grow the biggest kind of alfalfa. Then add phosphorus in some readily available form like basic slag or bone meal or acid phosphate. Use it freely, at least 3 pounds to the square rod and double that will be better. Add potash if on potash deficient soils and sow the alfalfa seed early in the spring—say the first week in April—with full assurance that it will be a success. Inoculate? Yes, if it is on land that has not had alfalfa.

know is just when to cut the crop. It must not be cut before the little shoots strat at the base of the stem nor be delayed in cutting after these shoots come. It must not be cut late in the fall but should go in winter with a good growth to hold the snow and protect the roots.

We feel now so assured that we know how to grow alfalfa on our land or on any man's land that we have perfect confidence and we believe that the year 1915 will mark the beginning of a great movement for alfalfa culture



TURNING ALFALFA HAY WITH THE DEW ON.

Sow it with a bushel and no more of beardless spring barley—do not sow oats—or sow a bushel of winter wheat or winter rye, and, having sown the seed covered lightly rest assured that an alfalfa field is yours.

The next striking fact you need to

in Ohio on a large scale. It is easy, but if you go at it, go at it right and do not trifle with it. When rightly put in and when fed from time to time afterward alfalfa is easily the surest of farm crops and the most profitable.

I find sweet peace in depths of autumn woods,
Where grow the ragged ferns and roughened moss;
The naked, silent trees have taught me this—
The loss of beauty is not always loss.

—Elizabeth Stoddard.

GOOD WORKMANSHIP IN AGRONOMIC LITERATURE

C. R. BALL

Secretary American Society of Agronomy

IT is self-evident that an enormous expansion of agronomic activity is taking place in these recent years. One proof of it is the veritable flood of agronomic literature, in the form of circulars, bulletins, articles, theses, memoris, and the like. Is it a fair requirement that, as the annual output increases in quantity, the workmanship of the individual paper shall improve in quality? If it is to be granted that such requirement is justly due to both author and reader, does the responsibility for improvement rest with the author? And, if so, are there signs that this responsibility is being increasingly felt? It may be worth while to speak of this subject from the standpoint of one who writes an occasional paper, edits many, and reads more. It is regretted only that this brief paper can not be weighed, digested and revised by the writer, as every contribution should be, previous to publication.

Present Quality of Agronomic Literature: Unquestionably the quality of agronomic writing is improving as the quantity increases. Quality here is of two kinds, quality of matter and quality of makeup, or presentation. There is marked improvement in the nature of the subject matter of agronomic publications. This is partly due, probably, to the greater precision of the experimental foundations on which publications are built. There is also considerable improvement in the form in which such matter is presented to the reading public. This is due, in large part, to the increasing editorial supervision given, by which process the "crooked shall be made straight and the rough places plain."

It would be a great pleasure to record that the improvement is due in part, also, to better educational preparation for writing, on the part of agronomic authors, but the proof of this is lacking.

Some Essentials of Good Workmanship. The keynote of all written communications should be a willingness to undergo any labor or pains necessary to insure full and easy understanding by the reader. Such clearness and accuracy in presentation are essential for two very different reasons. These are, first, that the author may receive full credit for what he has done and; second, and more important, that the reader may get a true concept of what took place and so the sum total of accurate and useful knowledge be increased. Clearness of presentation may be accomplished in three general ways, i. e., by (1) an orderly and logical development of the topic, (2) the use of clear and simple language, and (3) careful attention to such accessories as table and figure legends, complete citations, and so forth.

Logical Sequence of Arrangement: More often, perhaps, than is realized, clearness of presentation is lost or at least hampered through lack of orderly sequence of topics. For instance, an author, describing crop production, introduces his discussion of yield and crop disposal before his discussion of harvesting and threshing methods. The reader who knows is distressed in mind by the lacking of harmony between the known procedure and the evident presentation. The reader who knows not gets an erroneous impression of the natural methods of production. What

of the author who, in discussing laboratory experiments, presents first his data and conclusions and afterwards his record of conditions under which the results were obtained? It is idle to respond that no one would do these things because examples of similar treatments can be found, not only in bulletins but also in books.

The following is submitted as a simple, illustrative outline for the development of a discussion of experiments.

A. The Setting.

- a. Status of the subject.
- b. Reasons for the investigation.
- c. Beginning and duration of the experiments.
- d. Scope of the work.

B. Methods Employed.

- a. Methods of conducting the work.
- b. Apparatus employed.
- c. Methods of determining or computing results.

C. Results Obtained.

- a. Presentation of results.
- b. Interpretation of results.

D. Conclusions.

- a. Conclusions based on results.

A discussion of the status of the subject is important chiefly in comprehensive or monographic publications. The other topics vary in importance with different subjects and not all of them will be required in some cases.

Suitable Heads and Subheads: The use of appropriate headings and sub-headings in the text of a paper or book is of the greatest assistance to the reader. They are the signboards along the highway of the theme. They indicate the location of successive divisions and subdivisions of the topic and make possible prompt and pleasurable reference to any particular statement sought. However, nothing is more disconcerting than to discover that two

or three very different topics have been placed under one heading. This is the common method in newspaper composition where the text headings are really only specially emphasized news lines. Equally objectionable are compound headings which indicate that two or more topics are presented thereunder but in which the topics are not named in the order of their discussion. Take, for example, the head, "Soil and Climate," under which climate is first discussed. Another common and confusing practice is the use of subheads which are more comprehensive than the main head under which they occur, as, for instance, "Crop Improvement" arranged under, and subordinate to, "Seed Improvement." In manuscript the relative rank of heads and subheads should be shown by the use of capital and lower case letters, variously underscored. In proof, every care should be given to see that the printer does not destroy the effect.

Omission of Explanatory Data: Next to the lack of orderly arrangement, and perhaps properly before it, stands a common sin of omission. This lies in a failure to give that careful and complete description of the methods used in making an experiment or the conditions affecting it—by which, alone, can the reader judge the accuracy and value of the results. Oftentimes this failure to explain, or the giving of incomplete or unintelligible explanation, causes the technique to be misunderstood or the conclusions to be held open to criticism.

Complete Legends for Tables and Illustrations: In a sense a table or a figure is a unit by itself. Of course, it is more or less fully discussed in the text. By their size and nature, however, both tables and figures are likely to be separated somewhat from the

text which describes them. During railway journeys into unfamiliar regions, how we rejoice to see the large community advertising signs at the station of an enterprising town. We are genuinely glad to know its name, age, population, achievement and ambition. Tables and figures are the advertising signs of publications and if the legends tell a complete story it greatly enhances their value and our pleasure.

Use of New or Unfamiliar Terms:

Another prolific source of confusion is the use of new, unfamiliar, or inappropriate terms without explanation of their meaning. It is inevitable that, in the literature of a rapidly developing science, new terms must be invented and used from time to time. The great need is that these terms be chosen with care, as apt and appropriate, and, so far as possible, somewhat descriptive of the material, process, or appliance designated. They then should be defined or explained wherever used until they are fairly familiar to the writer's public.

Citations of Literature: If an author is truly willing to shift burdens from the reader to himself, he will en-

deavor to complete the citations of all publications to which he makes reference. It not only indicates thoroughness and accuracy on his part but makes his paper of vastly more use to others. The common reference to work done by Smith, Jones, or Brown, with footnote indicating hazily the journal and volume, is a weariness to the mind if not to the flesh. What is really due the reader is the full name of the indeterminate Smith, the full title of his paper, the abbreviated name of the journal, the volume number and inclusive page, and the year of publication. Only thus can the reader really determine the source of the reference, whether he himself wishes to consult the paper in question, and, finally, whether or not he has a reprint of it in his own files.

Conclusion: It may seem to many that each of the items discussed above is but a little thing. True, perhaps, but in the aggregate they loom large to the user of our literature. And after all, is not the keenness, accuracy and ultimate value of the man as an investigator likely to be reflected by the clearness, orderly arrangement and detailed completeness of his publications?



THE ADSUKI BEAN

W. J. MORSE

Scientific Assistant, Bureau of Plant Industry, United States Department of Agriculture

AT the present time the adsuki bean (*Phaseolus angularis*) is the subject of considerable discussion in the press as a desirable addition to American agriculture. It is native to eastern Asia and is grown extensively for human food in China and Japan, the latter country growing about 300,000 acres annually. Next to the soy bean, the adsuki bean seems to be the most

Massachusetts Experiment Station in 1889, the Kansas Agricultural Station in 1891, and the Rhode Island Station in 1893 and 1894. Beyond testing the beans for table use, no experiments appear to have been made by these stations with the plant as forage. Within the past few years, a large number of varieties have been introduced, and experiments as to yield of



FIELD OF ADSUKI BEANS, ARLINGTON FARM, VA.

important legume grown in Japan, and commands a higher price than any other bean. In all Japanese cities, adsuki beans and adsuki-bean meal are sold, while among the common cakes and confections are those made wholly or in part from the meal.

The first importation of the adsuki bean into this country, no doubt, was the "red-seeded beans" brought back by the Perry Expedition from Japan in 1854. The first experiments with the adsuki bean were carried on by the

seed and forage value have been carried on with success by the U. S. Department of Agriculture and several Experiment Stations.

The adsuki bean is a summer annual and adapted to about the same range of territory as the soy bean. The plant is bushy in habit, resembling an upright cow pea in growth, growing from 1 to 2½ feet high, according to variety and soil. The leaves persist until the pods are fully mature. The flowers are bright yellow. The varieties, about

60 distinct sorts, are distinguished mainly by the period of maturity and the color of the pods and seeds. The earliest varieties mature in about 90 days, while the latter require 150 days or more. The following seed colors occur: maroon, straw, gray, black, brown, orange, and variously mottled. The plant possesses root tubercles in abundance and is very efficient as a nitrogen gatherer.

Although tested out as a hay and green manure plant, it does not compete with the cowpea in choking out weeds. It is quite evident that none of the varieties can compete with either cowpeas or soy beans for forage purposes. On account of its heavy seed yield, however, it is likely to become of some importance in the United States, either for human food or for growing to feed animals. The yields of the best varieties of the adsuki bean range from 20 to 40 bushels per acre on relatively poor soils.

The seed should be sown as soon as danger of frost is past and the soil has become thoroughly warm. Sown in rows 18 to 36 inches apart, from 15 to 20 pounds of seed have been found satisfactory. The cultivation is the same as with any other row crop. The crop may be harvested readily with a mower or bean harvester. For hay, the adsuki should be cut when the pods are about one-half grown. When grown for grain, the cutting may be delayed until all the pods are mature. The entire amount of seed ripens uniformly, so its shattering habit is not serious. In threshing, the ordinary grain separator does very satisfactory work if run about the same as for cowpeas.

In Japan the adsuki bean is utilized in various ways for human food, chiefly, however, as a confection. The ma-

icon colored seeds are the ones most generally used, being the favorite not only with the Japanese but also with the Koreans and Chinese.

The adsuki bean is used as a vegetable when sprouted, and it is also boiled in soup. The beans are also eaten popped like corn, as a coffee substitute, and candied by boiling in sugar, the last product being called "Amanatto."

Adsuki-bean meal is sometimes prepared simply by grinding the dry beans and then removing the seed coats with sieves. More commonly, however, a wet process is employed. The wet process seems to vary somewhat in different parts of Japan, but consists essentially of four stages: (1) Boiling the beans until soft, usually after a preliminary soaking. (2) Crushing the cooked beans. (3) Removing the skins by forcing the mass through sieves or by putting the bean paste in cold water, when the skins are easily separated. (4) Drying the bean paste.

The fresh, undried bean paste is called "An" and the dried product "Sarashi-an." The meal is often used for making a soup or hasty pudding, which is considered a valuable food for invalids, the aged, and delicate children. The flour is also used for shampoos and to make facial creams.

The use of beans to make sweetmeats seems to be purely a Japanese invention, as there are no similar foods used by Europeans or Americans. There seems no good reason why a food so rich in protein and lacking any objectionable "beany" flavor should not become popular in the United States. American confectioners should be able to put the adsuki bean on the market in various forms of sweetmeats which will please the American taste.

LEGUME INOCULATION

T. W. YOCUM

Associate Editor The Ohio Farmer

ABOUT the year 50 A. D., a Spaniard, L. Junius Moderatus Columella, living in Italy, wrote a series of books called "De Re Rustica." In writing of the herb medic, now supposed to have been alfalfa, he states that it is extremely valuable "because it dungs the land." Other writers of long ago frequently commented upon the fact that leguminous crops enrich the soil but it was not until the eigh-

sion was drawn that legumes can assimilate atmospheric nitrogen. The next step was the observation that only such plants as develop root nodules or tubercles are able to increase the nitrogen in their tissues; that the amount of nitrogen fixation, is, in a general way, proportional to the number of tubercles.

These discoveries naturally led to experiments relative to the formation



Lime, manure and vigorous clover,
Make the old farm rich all over.

teenth century that this fact was fully realized by farmers in general.

It remained for the present generation, however, to discover the function to which this soil enriching is due. Through a long series of experiments it was demonstrated that legumes, grown in a soil lacking nitrogen and fed upon a food containing no nitrogen, in a short time did increase the amount of nitrogenous material in the plant and, since the only source of nitrogen was from the air, the conclu-

of tubercles. The tubercles would not form on legumes grown in sterilized soil but under similar conditions, if moistened with water that had been standing in contact with ordinary soil, the tubercles started growth. According to Dr. Conn of Wesleyan University, plants watered with such infusion show interesting stages of growth. They grow vigorously for a short time and growth then ceases for they seem to lack food. This is called the nitrogen hunger stage; each plant has used all

of the nitrogen in the seed and no more is available because the soil is sterile. These plants untreated with the soil water infusion become sickly and yellow, but those that are watered, after a few days of hunger resume their vigorous growth and become large-sized, healthy plants. No tubercles will be found on the roots of the former but on the roots of the latter will be found noticeable nodular development. The soil water infusions indicate that there are some agencies present which aid the tubercle development and this leads to the conclusion that bacteria causes the tubercles.

While there are still unsettled questions concerning tubercles the most important fact is that the legume has the power of fixing nitrogen through their aid. It is evident that if soil is to increase its nitrogen content, it is necessary for many tubercles to develop on the roots of legumes. The process of furnishing bacteria to plants is known as inoculation. Where the proper bacteria already exist in the soil, the inoculation is regarded as natural; when bacteria are lacking they are introduced into the soil by means of artificial inoculation.

The most common method of inoculation is by soil transfer and in actual field work it has given the most satisfactory results. The soil should be taken from a field in which the desired legume has previously grown; particularly from a field that has been deficient in nitrogen for legumes growing in such a soil will have greater nodular development. This soil should be neither wet nor dry; to obtain the maximum of bacteria, moderately moist soil should be taken, to a depth of about six inches. It should be placed in the shade until ready for use because the sunlight is very destructive to the micro-organ-

isms. If the soil is not drilled with the seed, it should be scattered broad-cast and immediately harrowed in. According to C. G. Williams of the Ohio Experiment Station, 300 to 600 pounds of soil per acre will give the best results.

Another method is inoculation by pure cultures. Those made by the government are put up in hermetically sealed tubes. The contents are mixed with water and chemicals included with the outfit are added to the solution to form the food supply while the bacteria are multiplying. The solution turns a faint, chalky color when the bacteria have increased sufficiently in numbers. It is then ready to pour on the seed. The seed should be dried in a shaded place and sown as soon as possible.

Some alfalfa growers of Illinois have practiced successfully still another method. A small quantity of soil is taken from an old alfalfa field or sweet clover patch, dried in the shade and then pulverized. A 10 per cent glue solution is made and poured over the seed and the soil, sufficient to absorb the moisture, then thoroughly mixed with the seed. To prevent any sticking together, the seed should be screened and then sown before the elapse of much time.

Many farmers have followed out one or more of the above methods to the letter yet obtained unsatisfactory results. A large per cent of these failures were no doubt due to the fact that favorable soil conditions and proper aeration were not taken into consideration. The U. S. Department of Agriculture obtained samples of soil from fields in various parts of the United States where attempts to inoculate legumes had failed and found that the effect of applying lime to certain types of soil, especially those which gave an acid reaction to litmus, was most strik-



DIGGING A TEN-FOOT ALFALFA ROOT.

ing when considering nodule formation. The following table taken from Bulletin 100—Bureau of Plant Industry, shows marked results with the use of lime in connection with inoculation:

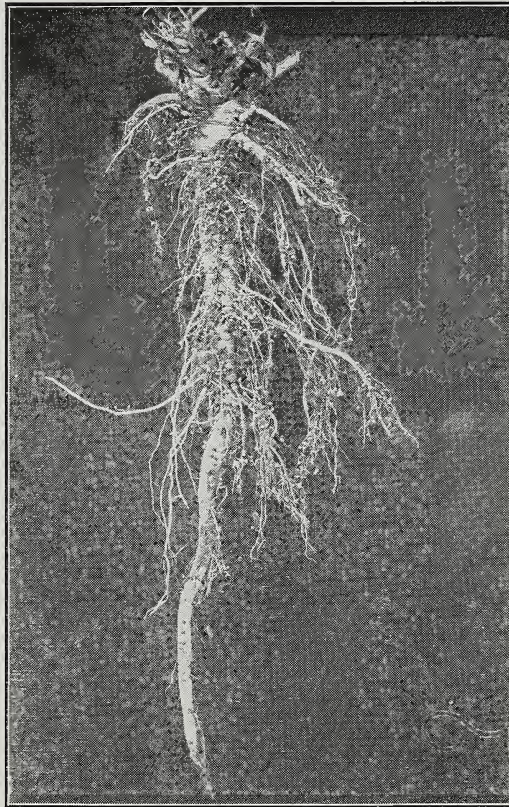
Quantity of Lime.	Green Wt. of Plant—Grams.	No. of Nodules.	No. of bacteria in cubic centimeter of soil extract.
Unlimed	2.5	31	87
Limed:			
2000 lb. per acre..	5.5	63	71,950
4000 lb. per acre..	8.5	88	128,650

Some experts have stated that aeration is an important if not a determining factor in securing an abundant nod-

ule formation. To obtain this the field in which the legume is to be planted, should be well drained and the seed-bed put in a good, friable condition. Kellerman and Robinson, government plant physiologists, obtained the following results in the aeration of soils in which legumes were growing:

Treatment.	Nodules on plant No.						Total
	1	2	3	4	5	6	
Aerated	4	20	25	8	26	4	87
Non-aerated ..	0	1	2	0	0	0	3

Legume inoculation is an interesting study. Much advancement has been made along this line during the past three or four decades. The future holds in store a broad field along this line of work.



ALFALFA ROOTS SHOWING NODULES

SELECTION AS A MEANS OF IMPROVEMENT

F. A. WELTON
Ohio Experiment Station

THE idea upon which the principle of selection rests is that among all plants, including our common farm crops, many variations, sometimes called "substrains," exist; that these may be isolated and preserved but that after isolation further selection produces no effect, not even if continued for generations unless there is called into existence by nature a heritable change (mutation) concerning the cause of which very little is as yet known. Selection of itself is not supposed to create anything new; to destroy or to preserve the new form observed is its mission.

The work of the breeder is, therefore, to keep an eagle-eye out for the variations which nature may send and to isolate and perpetuate those forms which give promise of meeting some special need or requirement. His success will be measured largely by the efficiency of the methods employed.

Before going further it may be of interest to note the frequency with which variations occur. Excellent opportunity for observation of this kind is afforded each year by the plant-row wheat and oat tests of the Ohio Station. Each year a few hundred heads—usually a thousand—of both wheat and oats are selected and planted each in a row by itself. In such patches variations are abundant. In the wheat, for instance, marked contrasts are evident with respect to such characters as hardness, yield, stiffness of straw, height, manner of growth, resistance to disease, etc. In 1913, for instance, out of 800 heads only 46, or less than 6% of the whole, went through the winter without any winter-killing. Among

those which were injured by the cold the degree of winter-killing varied from 5 to 76%. Among those in which there was no winter-killing, the yield per row (20 plants) of the highest and lowest was 119 and 24.6 grams, respectively. In other words, one head was found the seed from which proved to be nearly five times as productive as that from another.

Variations with respect to stiffness of straw are illustrated in Figures 1 and 2. Each represents the progeny of individual heads selected from one of our common varieties of winter wheat—the Gypsy.

Not all variations, however, are external as may be observed by noting differences in volume of loaves—a good index to quality of flour. A loaf made from the Early Ripe variety measured 1744 cubic inches while that made from an equal amount of flour from Ohio 6414, a selection of Early Ripe, measured only 1600 cubic inches.

Regarding method of selection, the weight of evidence indicates that little if any permanent progress is to be expected from so-called "mass" selections—that is, selections from mixed lots of seed, even if these are obtained from what appears to be the choicest of plants. For seven years, 1904-10 inclusive, the Ohio Station conducted a test, the object of which was to determine the importance of sorting out and using for seed only the largest kernels of wheat, no attention whatever being given to the parent plants. A winter variety known as the Velvet Chaff was passed through a fanning mill several times in order to remove all but the largest and plumpest seeds. With seeds

thus cleaned there was compared "un-screened" seed, that is, seed just as it came from the threshing machine without any cleaning. Each year the seed for each grade was secured from the crop harvested from that grade. Throughout the test the two grades were sown in duplicate; in one set at a uniform, in the other at a varied rate of seeding, the idea in the latter being to get on as nearly as possible the same number of kernels per acre.

Averaging the results for the seven

An explanation of these failures to make more marked improvement is found in the work of Johannsen and others. In his work with a commercial grade of beans, Johannsen found it to be made up, not of a single strain but of a multitude of substrains, and not until he introduced what he called the "pure culture" method, this is, selection from a single substrain, was he able to make marked and permanent progress. Moreover, he found no progress was made by selection of a vari-



PROGENY OF TWO HEADS OF THE SAME VARIETY GROWN SIDE BY SIDE.
Showing Stiff Straw.

years, and for both rates of seeding, the yields and weight per bushels for the two grades were as follows:

	Bushels per acre	Weight per bushel
Large	31.26	59.42
Unscreened	31.16	58.95

A test with oats conducted in the same way, and one which has now been in progress for six years, has resulted as follows:

	Bushels per acre	Weight per bushel
Large	57.57	28.90
Unscreened	57.01	28.28

ant within a pure line. From his work, therefore, he concluded that the role of selection was simply to isolate a substrain, hence the necessity for the use of what he spoke of as the "pure culture" rather than "mass" method of selection.

A little work by means of the pure culture method has been done at the Ohio Station within the last few years, and a moderate amount of progress along some lines seems to have been made.

In the matter of yield, for instance, one selection of Fultz wheat — Ohio

5309 — which was isolated in 1905, has been pitted against the original out of which it was selected every year for the past seven years, and in some seasons at as many as four different and widely separated points in the state; in all, 18 tests have been made. Only one year out of the eighteen has it failed to yield as much as the original. Occasionally the increase has exceeded that of the Fultz by 6 bushels. As an average of all tests the increase has been 2.52 bushels.

duces about 30,000,000 pollen grains and that each ear bears about 500 seeds. Therefore, on this basis each kernel is provided with about 60,000 pollen grains. With so much superfluous pollen flying about in the air there is, of course, much intercrossing with all the neighboring plants—good, bad and indifferent. In spite of this fact, however, it is possible to make some improvement.

While in the past increases from selection have not been great, yet a mod-



THE SAME VARIETY AS ON OPPOSITE PAGE.
Showing Weak Straw.

Likewise some progress has been made with oats. For instance, there has been found a strain of the Siberian variety—Ohio 6203—which seems to be one of some promise. Once in the last seven years it has failed to yield as much as the original, but on the average it has made a gain of 3.83 bushels per acre, the extreme increases being 1.13 and 9.55 bushels.

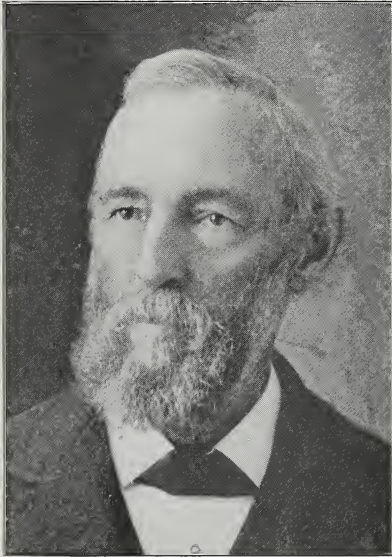
With corn, a cross fertilized plant, progress is more difficult. It has been estimated that an average tassel pro-

erate gain of 8 to 10 per cent—and that is not beyond our rightful expectations—in yield of Ohio's wheat crop would add annually to the wealth of the state approximately \$2,500,000. In view of the rapid strides being made in the science of experimental biology, much more than this may be expected in the future because one of the first and most important applications of the facts discovered will be to guide the selectionist by more reliable methods in his search for new and desirable variations.

PREPARATION OF THE SEED BED FOR WHEAT

WALDO F. BROWN, Oxford, Ohio

Revised by F. C. Brown



WHEN we stop to think that the preparation of the seed bed is the main thing that can be done for the wheat crop we realize the importance of thoroughness in this work. If wheat is to follow corn the preparation begins with the breaking of the ground for corn in the early spring. In fact, it begins away back in the history of the farm when the land was cleared and the ground dedicated to the use of farm crops. Many farms in south-western Ohio have been so handled that a good wheat crop is history, and the soil must be built up by the use of manure or proper rotation before another crop can be expected. The wheat crop is still one of the leading crops of the farm.

Where a regular rotation is followed wheat follows corn, clover follows wheat, and corn follows clover. Seeding is a difficult proposition in standing corn unless the corn fields have been

kept free from weeds and no storms have lodged the corn. It is often difficult to cut the corn in time for seeding wheat and the rotation is thus disturbed. If one must follow with corn on account of late maturing much care must be given the land to keep up a maximum fertility. In this event it is well to give the land an extra coat of manure before a wheat crop is sown.

Where land is to be broken for wheat the plowing should be done as early in the summer as possible. Land plowed in July will give a much heavier crop of wheat than September plowing will produce.

One of the most essential factors in producing a good wheat crop is to sow it on well drained land. Where tile drainage is out of the question much can be done to put the land in good condition by plowing the field in narrow lands and opening "dead furrows," thus making provision for an outlet so water will not stand on the fields. Outlets may be made with the plow at low places in the field so that water will not stand on the wheat. This is not ideal farming as such openings are an annoyance in the use of machinery and are apt to start washes but they can be used as a makeshift until proper drainage can be established.

When ground is broken in mid-summer it is of the greatest importance that the roller follow the plow. It is a good plan to plow half a day then roll thoroughly before any further plowing is done. Where two teams can be in the field a better plan is to follow the plow with the roller. When the ground is immediately followed by the roller much moisture is conserved and

in very hot, dry weather this should be done. Land that has been rolled before losing its moisture can be put in condition for seeding after a slight rain-fall.

We often hear the expression "Tillage is manure," and it is a well established fact that ground that has been kept mellow and free from clods during the heat of summer becomes vitalized and enriched so that seed sown in it germinates sooner and starts into more vigorous growth than it will if sown on land that is not broken until September. It is not a waste of time to go over the seed bed for wheat six times with roller and harrow. It is not always possible to do this but where it has been done results have been highly satisfactory.

To do efficient work the ideal seed bed must be constantly kept in mind. It must be thoroughly compact beneath with a mellow surface. Farmers learned this when they had no tools specially adapted to this work. In the olden days farmers turned on the plowed land instead of "back-furrowing," and thoughtful men noticed that this land

on which the horses turned gave a more vigorous plant than the land less compacted. Now we have heavy rollers that compact the soil ideally and the surfacing can be made mellow by using harrows especially made for the work. Mechanical skill has made possible an ideal wheat bed with a minimum amount of work.

It is not difficult to answer the question of why wheat requires a compacted seed bed. Seed that is rooted in a compact soil can better withstand the winter, as the roots are not easily thrown out by the alternate freezing and thawing. On clay lands it is easier to prepare a good seed bed than on prairie or bottom land. The great problem on prairie land is to so compact it that the heavy winds will not blow it away and so it will not be harmed by the action of frost.

Unquestionably there are many important factors in the production of a good wheat crop aside from the preparation of the soil, but without this thorough preparation a man has no right to expect large returns from his wheat land.



ADVANCEMENT IN AGRICULTURE

L. C. McCLUNG

International Harvester Company Service Bureau

THE year 1915 will probably see more improvement in farming conditions all over this country than any year in the history of agriculture.

This improvement will probably be more wide-spread in the South than in any other section of the country. For several years the people of the cotton states have been turning from the exclusive growing of cotton to diversified farming—the growing of alfalfa, oats and corn, increasing their pasturage, and raising more chickens, hogs, dairy cows, and beef cattle. The ravages of the boll weevil, the loss of soil fertility, and a general awakening to the opportunities of diversified farming and live stock raising have been the main factors which are changing agricultural conditions in the South. But all of these things will not have as great an effect in bringing about better things as the present cotton situation will have on all the people of the south.

They have looked to King Cotton for the best things in life. But now he has failed them, his magic wand is no longer able to take millions of dollars from the world and put it into the pockets of the southern farmers. In every part of the cotton belt, the farmers are realizing the importance of raising the things that they use on their tables, and not having to send away all their cotton money for them. They are beginning to get better types of live stock, and on many farms the razor back hogs are being displaced by hogs of more profitable breeding. The necessity for more pastures has been brought home to the southern farmers. In fact a large part of the farming land in the south should be kept in pasture all of

the time to prevent the soil from washing and to make live stock profitable.

As a live stock region the cotton belt has several striking advantages to other parts of the country. In many sections it is possible to pasture nearly all the year around, and grasses and legumes grow luxuriantly. In the Mississippi valley, there are thousands of springs, streams, which are advantageous to the stockman.

Of course, the cattle tick is a great drawback and discouragement. But the fight against the tick is being carried on successfully. Both Mississippi and Oklahoma expect to be above the quarantine line by January 1st, 1916. People are realizing the enormous losses there are every year from the tick—loss in market prices, loss in weight and retarded growth, and loss in the milk supply. When the South is free of tick, it is reasonable to suppose that it will become the greatest live stock section of the United States, and that the people will no longer have to send away millions of dollars every year for meat, pork, poultry, butter and eggs, and milk, as they are now doing. In turning to diversified farming the southern farmer of course, will not give up the planting of cotton, and nobody desires this. The South will continue to raise the largest part of the world's cotton, but it will also raise other crops, which with poultry and live stock, have brought prosperity to Iowa and Illinois. The increased growth of legumes will build up the soil and make cotton even more profitable than it is now.

In the Central West, Northwest and even in the East the increased acreage in alfalfa is the most hopeful sign of

improvement in farm conditions. For alfalfa is needed worse in the Northwest and on the run-down eastern farms than it is in the Central West or the South. Alfalfa, a deep sub-soiler, is really a vital necessity to farming prosperity throughout the larger part of the Northwest. Much of the soil fertility in this vast region has been taken away by the continual raising of wheat. To restore this fertility and to protect themselves against the drouth which characterizes the northwestern summers, the people must grow more and more alfalfa until every farm has a share of this leguminous crop. Nebraska has already become one of the leading alfalfa states of the Union. South Dakota is rapidly following her lead.

New England and the Middle Atlantic states have been slower than the Northwest and South in the growing of leguminous crops. But they are coming to it, and this coming year will see more alfalfa planted in New England and Middle Atlantic states than in any other year in their history. Abandoned farms in New England are the results of false system of farming, and the false idea that the city offers more opportunities than the country.

The most significant thing that heralds a better day for farming, is the tremendous increase of the schools that are teaching agriculture. Northeastern, southern and western educators are realizing that real education must fit the pupil for the duties of life, and that agriculture is the main duty of more people than any other profession. They see too that on the prosperity of the farm depends the prosperity of all other business, and to be prosperous the farms must be managed by young men and women who know how to make

the most out of what they have. The boy who knows something about soils, the relation of plants, who learns how to care for poultry and live stock and who realizes that agriculture is a fascinating and wonderful study will have a farm that will bring in much prosperity and happiness, and it will be an inspiration to the community.

The girl who gets a practical training in home economics is apt to make a successful wife. A practical knowledge of home conveniences and necessities are regarded as far more practical these days by level headed people than elocution, English or other more or less ornamental studies. They know that the knowledge or lack of knowledge on the girl's part of sanitation or home economics marks the difference between failure and disappointment and success and happiness. These things are the real things and the big things of life, and eventually they must be taught in all of the schools.

"Educate for the duties of life" will be the motto for the coming year. In the central west this new movement in education has gained a great headway, and it is through the central west that the rest of the country must look for inspiration. The boys' corn clubs and the girls' canning clubs, which are a part of the new movement, are increasing with astonishing rapidity in all parts of the country. There are no more hopeful signs than these clubs. They represent the very best element of the country. The boys and girls who already are fitting themselves for the duties of life; the influence of these clubs, will have tremendous effect in future years in building up more prosperous farms, better communities and the development of better and more useful citizens.

FERTILIZER FOR THE WHEAT CROP

STANLEY SINK, '15

FERTILIZER will not take the place of work, rain, sunshine or good common sense; but all things else being equal, a judicious use of fertilizer will pay a fair rate of interest on the investment. Differences in climate and character of the soil, however, cause a greater variation in the yield than the fertilizers used.

The outcome from the use of fertilizer will be most satisfactory when the wheat is grown on soil that is particularly adapted to it. Wheat does best on well drained rich clay and heavy loams and upland soils, though very good yields have been obtained on light moist soils. The abundance of organic matter is of great importance and will be one of the principal factors in determining the kind of fertilizer used on any given soil.

In many cases if more attention were paid to drainage, better results would be obtained from the use of the fertilizer. Nitrogen, when used by a plant, must be in the form of a nitrate, which is a readily soluble form. Hence it will very easily be washed out of the soil if too much water is present. The soil seems to have very little if any power of holding the nitrates against leaching as it has phosphorus or potassium. Even if the nitrogen be applied in the form of organic matter, it has to change through decomposition to the nitrate form before it can be utilized as plant food. Though the soil has a greater power for holding the phosphorus and potassium against leaching than has the nitrogen, some of those elements will be lost in a wet, soggy soil. More of the first two elements will become unavailable and be lost to plant uses even though the plant sur-

vives the excess water. Potash leaches out in a wet soil to some extent, but its greatest loss is from the lack of conditions necessary for its liberation. Wet soils usually need lime and here is where the greatest loss is incurred in the plant food. The decay of organic matter in a wet soil leaves an acid condition that must be corrected by lime.

In a well-drained soil, the organic nitrogen will speedily be changed to the nitrate or available form through the three successive steps of decay, ammonification and nitrification by the action of the aerobic bacteria which can only thrive in a well drained soil. This free action of bacteria on the organic matter of the soil liberates the plant food of this organic matter and also has a tendency to make available some of the reserve plant food that has been locked there by nature.

The net profit obtained from the use of fertilizer may be greatly influenced by the soil acidity or sweetness as the case may be. In the absence of sufficient lime, the processes of decay are hindered, ammonia is lost through leaching and evaporation, and phosphorous and potash are rendered unavailable by the presence of acids. The available form of phosphorus is the monocalcium phosphate form. In sour soils, the iron oxide gets hold of the phosphorus and holds it as firmly as if it were locked in a steel safe as far as the plant's power of getting it are concerned. The iron oxide is an insoluble form of phosphorus and very unavailable. Now when lime is added to this sour soil, the calcium of the lime takes the place of the iron, thus converting it into a more soluble form. The resulting tricalcium phosphate is

yet insoluble but easily made soluble in the presence of carbon dioxide and organic acids, usually present where organic matter is decaying.

At the Ohio Experiment Station some very interesting experiments have been conducted along the line of using lime in connection with the use of fertilizers on wheat. In this experiment, 38 pounds of nitrate of soda, 30 pounds of acid phosphate and 108 pounds of muriate of potash were used on limed and unlimed land. On the former the fertilizer gave an increase of 14.61 bushels per acre, and on the latter gave but 13.88 bushels. In all their tests, lime was used at a profit with the exception of where basic slag was used as the source of phosphorus. The Wooster farm is south of the glaciated area and in that region nearly all the soil is deficient in lime.

Another great factor in determining the net gain from the use of fertilizer is the proper preparation of the seed bed. If the wheat is to follow a crop like oats, the ground should be plowed as soon after the crop is taken off as possible to prevent undue loss of moisture through evaporation, both direct and through weeds. By this method the weeds can be kept down, the soil properly compacted and put in fine tilth for the wheat crop. The upper 3 or 4 inches must be finely pulverized to insure the prompt germination of the seed and complete dissemination of the fertilizer particles, where they may be dissolved by the soil moisture and be easily attained by the young plant.

The time has come when people realize the necessity of buying fertilizer according to the needs of the soil rather than the kind of crop to be grown. The type of soil has more to do with the

determining the kind of fertilizer than the crop grown. An analysis given in Hopkin's Soil Fertility and Permanent Agriculture, of a clay loam of New York, is as follows: It contained 2960 lbs. of nitrogen, 1360 lbs. of phosphorus and 23,490 lbs. of potash in the first 6 $\frac{2}{3}$ inches per acre foot. A peaty soil of the same state showed 45,900 lbs. nitrogen, 3600 lbs. phosphorus and but 6560 lbs of potassium.

While the chemical analysis does not tell how much of the total plant food is available, it would seem that if the first type of soil had a fair amount of nitrogen, the second type would have an abundance of that element. Likewise the potash content of the former is very abundant in comparison with the latter. A very good rule then seems to be that nearly all soils at least need phosphorous. The clay soils need little potash and nitrogen according to the previous methods of culture. Sandy soils need all three of the fertilizing elements as a rule. An experiment carried on by the writer proved that the above rule worked fairly well. The farm is in northern Ohio, in the corn belt, and most of the land in that section is of the dark clay loam type with occasional sandy loam type. - On a sandy loam type of soil, a complete fertilizer was used containing 2% ammonia, 10% phosphoric acid and 10% potash. This mixture sown at the rate of 200 lbs. per acre gave a yield of 26 bushels per acre and where the same analysis on a plot of the same type of soil, with the exception of the per cent of potash was cut to 5% instead of 10 as in the first place. This plot gave a yield of but 18 bushels per acre. On a field that consisted mostly of a clay loam type, only the acid phosphate was used with about the same result as

with the complete fertilizer on the sandy loam. All the wheat was sown within a few days of Sept. 22.

After the soil type has received due consideration, the next thing is to consider from what source to get the plant food that is to go into a fertilizer. Many experiments have been carried on along this line and one of the most typical ones is an 8-year test of the Ohio Experiment Station. Below is a tabulated result of the experiment.

Carrier.	Increase in Bu. per Acre on:	
	Limed Land.	Unlimed Land.
P in acid phos. 20 lbs.....	8.54	7.47
P 20 lbs. in A. P. 108 lbs. K.	9.05	8.08
N 38 lbs. with P 30 lbs. and 108 K—		
N in nitrate of soda.....	14.61	13.88
N in linseed meal.....	11.73	12.88
N in dried blood.....	12.06	11.26
N in sulphate of ammonia.	13.90	11.35
N 76 lbs. in nitrate of soda, with 20 lbs. and K 108 lbs.—		
P in acid phos.....	15.71	17.44
P in bone meal.....	12.40	14.60
P in basic slag.....	15.98	16.75
Yard manure estimated to carry 114 lbs. N, 48 lbs. P, and 112 lbs. K.....	16.60	16.09

The average for the unfertilized plots was 15.01 for the limed and 12.64 for the unlimed. Muriate of potash was used on all the plots, as it seems to be the only source of potash under consideration. In these tests it is plainly seen that nitrate of soda has no equal as a source of nitrogen and acid phosphate is the best source of phosphorus. These forms are readily available and that is what wheat requires to give the best returns. In some localities it is a

common practice to use bone meal as a source of phosphorus, the idea being that it helps the grass more than the acid goods and that the grass is the primary object in sowing the wheat. Another practice is to use tankage for part of the ammonia carrier and nitrate of soda for the rest. Where one purchases the ready mixed goods, such manipulation is impossible, but when the raw goods are bought, then it is possible and feasible. The Ohio Station found in a series of experiments that nitrate of soda gave the best money return if part of it was applied in the fall and the remainder as a top dressing in the spring. In this way the plant gets the nitrogen when it needs it most and there is little nitrification going on in the soil.

Wheat being a grain crop, would need a greater proportion of phosphorus than would a grass crop, as that is the vital element in the development and formation of the germ of the grain. Though the nitrogen and potash are necessary for the production of a large stalk and head, if the phosphorus is deficient, there will be a larger per cent of sterile flowers, hence less grain. When the phosphorus supply is abundant the grain will be of a finer grade and a smaller per cent of shriveled grain.

On account of the great variations in the soil types on different farms and possibly on the same farm, there has been no attempt to formulate any standard formulae or portion of the different fertilizing elements that would be best for wheat. The soil type, previous cultural methods and state of fertility would rule that and there are no two farms that would be alike in those respects.

THE NATIONAL DAIRY SHOW—THE MAKING OF A WINNING TEAM

L. L. RUMMELL, '15

AND Ohio won! With three four hundred dollar scholarships, three silver cups and two gold medals the Buckeye team, on October 23, carried away more premiums than any other team that ever entered the Students'

is among the greatest dairy states of the Union? Where are the champions found and where do we expect to find the future winners but in Ohio? Rightly should the money and the cups come to the queen of the dairy states. She



THE OHIO STATE DAIRY CATTLE JUDGING TEAM.

Left to Right—C. E. Wylie, Gilbert Gusler, Coach; R. Wylie, L. L. Rummell.

Judging Contest at the National Dairy Show. For the first time since the contest began Ohio won first place and some of the money prizes, and this year she took more prizes than all the other fifteen states combined received.

But why should we not expect Ohio to be among the first, situated as she

deserves them in recognition of her service.

The Ohio State team took every advantage that was available in its position. Long before the team was chosen the best herds in the vicinity of Columbus and Springfield and at Lancaster fair were visited. On the

evening of October 18th, Prof. Gilbert Gusler started with his team consisting of L. L. Rummell, C. E. Wylie and R. Wylie, to visit some of the largest dairy farms in northern Ohio. Here is where the real work in training the team began. The animals judged on this three-day trip were generally good representatives of the breeds—many of them being more typical than those used in the contest at the National Dairy Show. Every moment was utilized to put into shape a record team. Special emphasis was paid to the matter of writing reasons as this factor counts as one-half of the total score in the contest. The coach had worked out a well formulated, yet concise system of presenting reasons and he had studied every point detailed on the score cards of the various breed associations. Each man was then given this composite, comparative score card, and thus each point given special emphasis by the breeds was easily seen. Herein lies one of the factors for Ohio's high score, for the reasons of this team were in the lead of many in the contest. For instance in the Jersey classes the Ohio team took first, second and third places among the forty-eight men, even though two Ohio men misplaced the first and second animals in the bull class, and men on other teams had correct placings. This was evidence that the faithful and untiring efforts of the coach in regard to elegance of expression in presenting reasons met with the favor of the judges. To Prof. Gusler truly belongs the honor that has accrued from the Judging Contest this year.

On Monday the team visited Anna Dean Farm at Barberton where some of the best individuals in the Guernsey world were inspected. This is the

home of Spotwood Daisy Pearl, the ex-champion Guernsey cow, and Murne Cowan, who is expected to excel May Rilma in her yearly record in fat production. Later in the day Mr. Peck's Guernsey herd at Macedonia was visited. On Tuesday the men went to four herds in the vicinity of Cleveland. At Willoughby they were met by a wagon from South Farm where production and show ring champions of the Ayrshire breed were judged. At Hilltop Farm at Wickliffe, Jersey winners at the Forest City Fair were viewed and at Belle Vernon Farm lines of Guernseys were drawn up before the eyes of the members of the Ohio Team. Cherry Farm furnished three excellent rings of Holsteins. The third day was spent with great enjoyment at Kee-waydin Farms owned by E. H. Baker at Gates Mills. Here is one of the few herds that combine show ring type with production. The average production of this herd is above 530 pounds and the youngsters in the herd are fair prospects for the 600 pound mark.

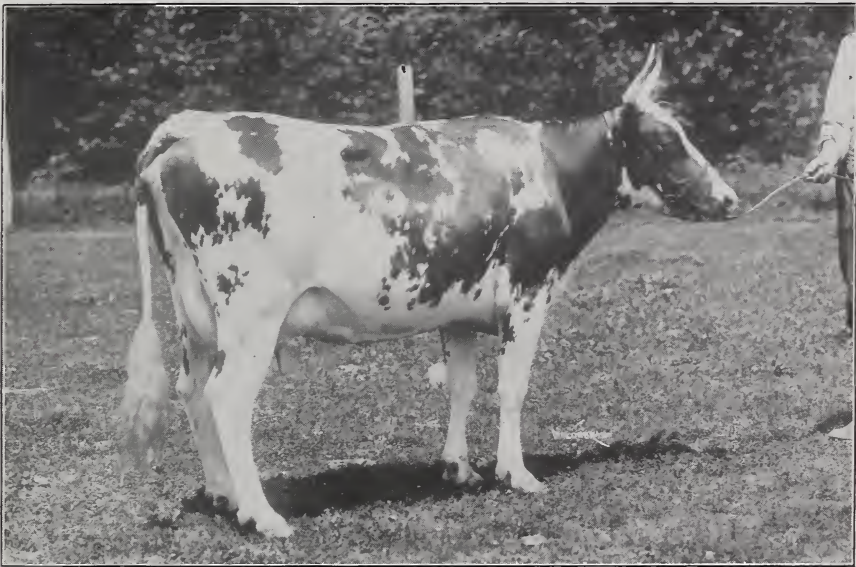
The Holstein herd of Cooley Farms, owned by the city of Cleveland, was the last place visited on the trip. On the eight farms included in the trip twenty-five rings were placed by the team, including about 100 animals. The number of dairy animals on these farms would approach 1500 head. Excellent individuals were selected for the placings. Everywhere the best hospitality was shown the team by the owners and managers of the farm. It seemed that everyone recognized a winning team and all wished to do their best to help along the cause. An expression of great appreciation is due the owners of these farms for their spirit of good will and co-operation.

The Ohio State team left Cleveland

Wednesday evening and enjoyed a day's rest before the contest. The fact that Ohio had been taking a low place in previous years stimulated enthusiasm and every man entered the ring with a determined, fighting spirit.

The competition for the cups and scholarships is indeed worth while, and the educational benefit is not to be overlooked, as this is the primary purpose of the show. The demand is for more and better leaders in the dairy in-

dustry, was given a number to be used throughout the contest. Fifteen minutes were allowed for placings and the same time for writing reasons on each class. The results of the contest were announced Saturday evening at a banquet for the teams, coaches and men prominently connected with the Dairy Show. B. H. Rawl, Chief of the Dairy Division of the United States Department of Agriculture, acted as toastmaster. Among the speakers were



AN AYRSHIRE CHAMPION.

Ethel of South Farm. Owned by John Sherwin, Willoughby, Ohio.

dust. It is the purpose of this contest to arouse enthusiasm in dairy education through friendly competition; experience has shown that the contest has a great value.

The classes of animals in the contest were by no means the best individuals at the show. The bull classes consisted of aged and young stock, so that a correct placing was indefinite. There were eight classes, one each of cows and bulls of the four dairy breeds. Each student after being assigned to one of four groups put in charge of an

W. E. Skinner, general manager of the show; J. A. Walker, H. H. Wing, of Cornell University, and D. O. Lively.

The three highest ranking teams in each breed were as follows:

AYRSHIRES:

1. Kansas Agricultural College.
2. Iowa State College
3. Massachusetts Agricultural College.

GUERNSEYS:

1. University of Arkansas.
2. Massachusetts Agricultural College.
3. Kentucky State University.

HOLSTEINS:

1. University of Maine.
2. Cornell University.
3. Delaware Agricultural College.

JERSEYS:

1. Ohio State University.
2. Iowa State College.
3. University of Maine.

The first team in each case was awarded a silver cup by the respective breed association. Ohio won the Jersey cup by a score of 184 points above Iowa State College. The rank of the teams was as follows:

1. Ohio State University.
2. Kansas State University.
3. University of Maine.
4. University of Missouri.
5. Iowa State College.
6. Kentucky State University.
7. Massachusetts Agricultural College.
8. Delaware Agricultural College.
9. Nebraska State College.
10. Cornell University.
11. Maryland Agricultural College.
12. University of Arkansas.
13. New Hampshire Agricultural College.
14. South Dakota Agricultural College.
15. Oregon Agricultural College.

16. University of Pennsylvania.

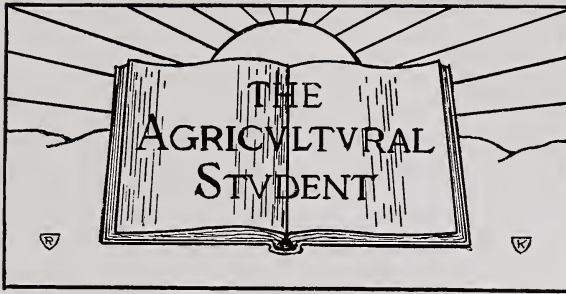
Ohio secured a score of 3748 $\frac{3}{4}$ points out of a possible 4800, a score of 129 $\frac{1}{4}$ points above Kansas State University. The Ohio team was awarded the \$400 sweepstakes scholarship offered by the Iowa Separator Company. Along with this the Buckeye team carried away the sweepstakes cup offered by the National Dairy Show Association and "Hoard's Dairyman."

Robert Wylie, of the Ohio team, received a total score of 1293 $\frac{3}{4}$ points of a perfect score of 1600, the highest individual score in the contest. He was awarded the scholarship offered by the De Laval Separator Company and one of the five gold medals.

L. L. Rummell, of the Ohio team, won the \$400 scholarship offered by the American Jersey Cattle Club to the man receiving the highest score on this breed. His score was 352.5 of a perfect grade of 400 points.

The Holstein scholarship was awarded to C. L. Blackman, of the University of Maine, by only 11 points over an Ohio State man. C. E. Wylie, of Ohio, won first place on Guernseys, but no prize was awarded by the Guernsey Cattle Club nor the Ayrshire Breeders' Association.





OF

OHIO STATE UNIVERSITY.

A MEDIUM FOR EXCHANGE OF IDEAS BETWEEN COLLEGE AND FARM

Published by the Students in the College of Agriculture.

Established 1894.

Subscription Price, One Dollar the Year.

Entered at the Postoffice at Columbus, Ohio, as Second Class Matter.

STAFF.

L. L. RUMMELL, '15, Editor-in-Chief.**A. J. BISHOP**, '15, Assistant Editor.**R. J. KINKEL**, '16, Art Editor.**C. E. WYLIE**, '15, High School Editor.**R. L. GEORGE**, '16, Business Manager.

Associate Business Managers:

H. W. Zuercher, '16.**C. H. Elliott**, '16.**I. O. Koch**, '17.

Associate Editors:

A. S. Wing, '15.**D. P. Evans**, '16.**D. W. Williams**, '15.**D. G. Swanger**, '16.**C. M. Baker**, '16.**L. P. Foster**, '15.

COLUMBUS, OHIO, NOVEMBER, 1914.

EDITORIAL

Again we come to our readers in a special Fields Crops Issue. Surely there is no subject in farm life of greater importance, nor any line in which there are greater advantages for improvement. Daily we see the live stock breeder studying his individuals in order to produce an animal with the best combination of type and usefulness. He has made great advancing strides, but still he is continually watching for variations, the most successful matings, and more reliable methods for the improvement of his live stock.

Why should the plant breeder not take a lesson from him? If the careful breeder can increase the production of his dairy herd by a few pounds of butter each year, why can not the man who

raises grain almost exclusively use methods of selection in like manner.

He can do this easily, but the average farmer fails to realize the importance of the situation. When he comes to work with these smaller forms, he often fails to use the same plan. How great would be the gain if every farmer were to increase his wheat crop by one bushel next year through careful selection of the best seed! How great would be the reward if every farm grew clover and alfalfa in abundance instead of timothy and other non-leguminous crops! How great would be the prosperity of the country if selection, breeding for disease resistance, or cultivation brought ten bushels more corn per acre! If we can accomplish only a small part of this task, truly our efforts will be rewarded.

The Ohio State Dairy Cattle Judging team this year certainly made an enviable record.

THE DAIRY TEAM. Ohio should be proud of the standing. The university should receive a great boost by the event. The advertisement cannot be measured. Probably there has never been an athletic event that has brought so much renown to the state. Neither the debating teams nor the Fat Stock teams ever brought home the bacon as the Dairy Team did this year. It will mean that Ohio, already a famed dairy state, will be raised to an even higher plane of recognition.

Such a victory displays team work. It shows careful training, despite the fact that dairy cattle judging is considered somewhat a game of chance. The art of judging has various phases of meaning and includes numerous types. Some cattle judges emphasize type, trueness of lines, quality and refinement, while others reason that the chief aim of the dairy breeder is to secure an animal of great capacity and production even though some refinement and type be sacrificed. The combination of the two is the ideal sought in many cases. Just where to draw line between the two is a serious and difficult problem.

This combination of type and capacity—the all around show animal and producer—was the mark kept before the eyes of the members of the Ohio team this year. This was the constant warning of the coach, Prof. Gilbert Gusler. To him the honor is due that has accrued from the contest. It was he who trained the team by faithful, sincere and untiring efforts. It was he who kept alive the fighting spirit and gave the men encouragement even to the minute they entered the

contest. It was a pleasure to work with him. It was an honor to know him.

Victories may pass through periods of fluctuations. Ohio has never been in first rank before, nor has she ever taken a money prize in any former contest. But this year more prizes were taken by the Ohio team than all other fifteen teams in the contest, and more than any one team ever won in any previous contest. This sets a high mark for the other teams to strive for. It behooves every student interested in dairy cattle to decide he is going to be a contestant for a place on the Dairy Team next year. With the experience of this year's contest the coach may expect to keep Ohio high among the teams in this contest.

¶ ¶ ¶ ¶

Have you read where Ohio stood among the sixteen states at the National Dairy Show? Do you know where Ohio

RECOGNITION OF THE JUDGING TEAMS. ranks among these states when the recognition of the team by the University alone is considered? She at once goes from first to last place. It is a singular fact that the state university receiving the greatest honors at the contest shows the least appreciation of this honor. Ohio and Kansas stood first and second in the Students' Judging Contest. In regard to the rewards to their teams in university credit or defrayal of expenses they stand sixteenth and fifteenth respectively, among the sixteen states. Would you believe that each man on the Ohio State University Team had to pay two dollars to have the name of the Ohio State University entered in the Contest at the National Dairy Show? Kansas State University pays this fee.

Otherwise the two states are under similar conditions of reward of their merits. The Kansas team is waging war for recognition, and so is the Ohio team. When the athletic or debating teams go to other cities to enter contests, they have all their expenses paid. The University band was sent to the Case game with no loss of money on their part. It is true there are receipts from these contests, but this argument has no purpose. These receipts do not defray the expenses, but still our teams continue to travel.

There are a number of reasons why the members of the Dairy and Fat Stock Teams should be given suitable recognition. In the first place it will bring more men into the preliminary contests. Many good men are kept from the try-outs because they cannot see their way clear to meet the expenses connected with the trip. How many men would be on the Varsity teams if they had to pay from \$50 to \$100 to be on those teams? We dare say Ohio State would not have the champion players she has now.

Furthermore, the University should bear the expense of these two teams to be as progressive as other state colleges. Ohio is the only state having a dairy team meeting its own expenses. If Maryland, Delaware, and Maine can pay the expenses of their teams, why can Ohio not do the same thing when we are much closer to Chicago than these eastern states? Should Ohio men not be given the same recognition as the chosen men from other colleges?

There may be three ways to show this appreciation of merit. The first will be in giving university credit. Cornell allows one hour; Maryland, eight hours; South Dakota and Arkansas, three hours credit for the work in trying out for the team and the trip

to the Show. The team is chosen from a class in Advanced Dairy Cattle Judging. The Fat Stock Team at Ohio State receives four hours credit. The Dairy Team receives no credit.

Then the University may pay the expenses of the teams. Below is the amount of money that each college allows the members of its Dairy Team:

Cornell	\$40
Massachusetts	80
Maryland	65
Missouri	20
New Hampshire	53
Maine	60
South Dakota	33
Delaware	75
Iowa	25
Kentucky	50
Arkansas	50
Pennsylvania	30

And Ohio men even pay to enter the name of the University in the Contest!

The third way would be to give the men on the team a "letter." Those on all other University teams receive this distinction, even the men in the military department. Yet the teams that go to other states to represent Ohio cannot wear the official "O." The members of the Iowa team in addition to their expenses receive a gold letter from the University. Does it appear that the square thing is being done to Ohio State Judging Teams when they bring fame to their State and Alma Mater, and then must even pay to have the name of Ohio State University entered in these Contests?

¶ ¶ ¶ ¶

November is swiftly passing by—too rapidly for us to realize its meaning, too quickly for us to love its significant beauty. The woods are bare and still; the days, clear

THANKSGIVING.

and bright. The winds give wild music amongst the faded woods. The brown fields, the shocks of corn, the silvery frost, the golden leaves fallen to the earth—all proclaim that November, the latest of her race, must soon leave a vacant throne.

But soon that day of joy, and gratitude and thanksgiving is near at hand. As Nature has dismantled her bright vendure, she invites us to think soberly and sincerely of our debt to Him who has so generously watched over us.

Now our land rests in peace, prosperity and contentment. Bounteous crops bring joy to the farmer and he raises his voice in thanksgiving to the Wise Provider. Let us forget all cares and make it a day of festivity, good fellowship and great joy. Let us join with the poet when he said:

“For peace of soul—which money never buys,
For freedom in a world which is not free,
For God’s outdoors and overarching skies,
For all the season’s changing mystery,
For life and love that comes to me and thee,
Let us give thanks.”

¶ ¶ ¶ ¶

A course that would fill a long felt need in the Ohio College of Agriculture

is that of agricultural journalism.
AGRICULTURAL JOURNALISM.

This subject offers a wide field of service and capable, efficient men are few. The agricultural press of the country today at once is evidence of this fact. We need more and better trained men in the journalistic field for agricultural papers. To meet this demand a course should be instituted in the college of agriculture separate from other similar work.

Agricultural students in particular seem to shun work in English rhetoric and classics. Too often they regret the fact after graduation that they have been unable to express their thoughts

in clear, concise, sensible English. The trained agriculturist in any line of activity will often be called upon to deliver addresses or contribute articles for the farm press. Too often we find that the articles from graduates of agricultural colleges must go under the close scrutiny of the editor with the blue pencil.

If more English courses were required in the curriculum of the agricultural college, a step would be made to solve the problem. One of the first to be recommended after the required freshman work would be a course in journalism. It is true that we already have a branch of journalism in the Arts College, but this is not sufficient. The daily news reporter has no place on the up-to-date agricultural weekly or monthly. His views are colored too much in many cases to meet the requirements; he must have a different means of approach because he reaches a different class of readers. Men of higher character are needed on the farm paper than on the daily; they have a more lofty mission and come closer to the home circle.

Iowa State College offers a course in Agricultural Journalism in which no attempt is made to fit students for the daily field, the nearest approach being work pertaining to rural weekly news-information and feature stories along the student’s special line. He is not asked to acquire ease of expression and an idea of his purpose in writing by a round-about training on a daily newspaper.

Why can a similar course not be installed at Ohio State? Opportunities are as good for such a course as are now afforded on the daily paper. The need of the course is great; the returns should be even greater than our present apparent demand



For the benefit of children in rural school suggestions for a series of lessons on corn are about to be issued by the U. S. Department of Agriculture. The average production per acre of corn in the United States is still below 28 bushels despite the fact that in almost every section of the country yields of more than 100 bushels have been obtained. The difference indicates in a measure the value of proper instruction in growing corn. The spread of boys' corn clubs all over the country has also emphasized the need of corn study in rural schools.

The forthcoming bulletin contains outlines of 12 lessons covering such important points as the different kinds of corn, ways of judging corn, seed, corn crop rotation, best kind of fertilizers, proper cultivation and the food value of the crop. Suggestions for the proper observance of corn day have received consideration. Rural school teachers, especially in the great corn-growing states, will find the bulletin a valuable aid in the work of stimulating in their charges a healthy interest in sound agriculture.

This bulletin will be published under the title of Farmers' Bulletin No. 617, "School Lessons on Corn," and copies will be sent free as long as the supply lasts.

The rural population is more willing to support better schools today than at any previous time. It is being realized that all educational activities or agencies must be more or less correlated, and, more than all else, that they must be made accessible to the children. In many counties where bad roads prevail, most of the schools are of the antiquated one-room variety. They are usually located along bad roads which, during the winter, when the schools are usually in session, become so nearly impassable as to make it difficult for the children to reach them.

On the other hand, in counties which have improved their roads, the schools are easily reached, the average attendance is greater, the efficiency largely increased and economic consolidation made possible. Regular attendance at school means consistent and regular growth of both school and pupil, and consolidation of schools means a maximum of efficiency at a minimum of cost. It is also noteworthy that there is a marked tendency for the consolidated school to become the social and intellectual center of the community. Most modern rural schoolhouses are so constructed as to serve the community as gathering places for various kinds of public meetings, and where vans are used to convey the children to school during the day they are frequently pressed into service to haul the farmers and their wives to institute work, lectures, or entertainments at the schoolhouse. The consolidated school becomes a sort of community center to which all educational and social activities converge, and in order that it may properly perform that function all of the highways leading to it should be so improved as to render it readily accessible throughout the year.

WORKING AIM FOR THE TEACHER OF HIGH SCHOOL AGRICULTURE.

Agriculture is one of those studies that is helping to answer the demand for something practical in high school education. Therefore, it should be the aim of every teacher of agriculture to so present it as to give it its greatest practical value. It is our duty as high school teachers to contribute our share in turning out from the schools cultured and self-supporting men and women who are able to take up efficiently the duties of citizenship. Certainly the teaching of agriculture has to bear its share of the responsibility.

I do not think that the teacher should aim merely to make farmers of the students of agriculture for it is not within the scope of the high school to give enough training in real practice farming. This belongs more to the strictly vocational school, for it is the duty of the student to get considerable of such training on the farm. But it is within the power of every school and every teacher to try at least to accomplish three or four things. Firstly, the teacher should aim to get the student close to nature and see the use it makes of its general laws. The power of keen observation is thus stimulated. The pupil should learn the fundamental principles of agriculture, and these should be taught as principles and laws and not as mere facts. He should acquire some skill in the application of these principles. Of course, we must remember that this is a broad science, and that we are dealing with the immature minds of the high school students. Consequently, it must not be expected that all phases of the subject can be thoroughly investigated. This must be governed by the material available for study, and by the interests of the community.

Again, it is within the power of all to teach the student to be able to read and understand the great mass of agricultural literature at his disposal. Here, oftentimes, is a great fund of knowledge that lies untouched, and needs only to be brought before the minds of those that are hungry for such material.

Lastly, but not least in importance, is the great opportunity of the teacher to interest the student in country life, and thus do his share in checking the flow of our youth into the cities. This can be done by creating a sympathetic attitude of the student towards agriculture and those engaged in its pursuits.

Of course, a great amount will depend upon surrounding conditions, but if these aims are carefully worked out, the cultural side of education will have received some attention, and certainly a great amount will be done towards accomplishing the practical results.

EDWARD ROUDEBUSH,
Goshen, O

THE MEETING OF SCHOOL AND FARM HOME.

Last winter an Ohio rural school boy came home with a number of interesting problems that had been given his class that day by their teacher. They were problems about some very ordinary things that closely concerned the every-day life on the farm. One of them wanted to know how many bushels of wheat could be stored in the bins of the granary at the home of each of the pupils. The problems gave no dimensions, as each pupil was to do his own measuring. A second wanted to know the capacity in bushels of the corn cribs. The third asked for the number of barrels of water that would run off the barn roof during a rainfall of one and a half inches. The six remaining problems all dealt with

some practical phase of every-day farm life. In the solution of every one of them the boy would put into actual practice more or less abstract formulas for finding the cubical contents of solids of various forms. That evening, the arithmetic lesson for the next day became the subject of lively discussion in the home of this particular boy, and doubtless in many of the others. The father had received his education in the rural school of another day. One of the tests of real scholarship was the ability to solve hard problems—examples they were then called—in arithmetic. Father and son worked together on the next day's lesson. It was somewhat different from the old sort of arithmetic lesson, for there were no answers to refer to, and none of the problems seemed to come out even. (How like unto this are the problems of every-day life—they are original, and the answers are not often given, and oftentimes they do not come out even!) The father kept his answers, and on comparing them with those obtained at school, he found that there were three with which he could agree, and it was three days before he could see wherein he was wrong. An unexpected result followed this series of problems. The father was led to consider some things he had never thought of before. One was this: He had to depend entirely on the barn cistern for his farm water supply. He saw that a rainfall of only $1\frac{1}{2}$ inches for a month during the summer would not furnish sufficient water for his needs, so he speedily became persuaded that he ought also run the water from a large shed into the cistern as an additional safeguard against a prolonged drouth.

What occurred in this country home is typical of what is going on all over Ohio. The school and the farm home

are being brought closer together. The instruction in school is becoming better fitted to the needs of farm life. The ways in which this is being done are many. Here are a few of them: A farmer began sowing wheat. He was a little doubtful about his seed. He sent a sample of it to the neighboring high school. Some of the pupils there examined the seed with a glass, and determined the per cent. of worthless grains. The next day, this man increased his rate of sowing one peck. The next spring one could tell the exact place where he began sowing at the increased rate. Another man in the same community wished to sell one of his cows. He did not decide on which one he would part with until he had sent a sample of milk from each to the school where it was tested for its per cent. of butter fat. Another school tested more than half of the seed corn planted in the district. A high school having a class in manual training made a number of porch swings. Many porches in the community were fitted with these conveniences. This same class made about all the equipment in the way of tables, cupboards, etc., that were needed by the domestic science class of the same school. Another school inspected the apple trees in several orchards, and found plenty of two different kind of injurious scale insects that were just beginning to make their appearance. This led to thorough and timely spraying which otherwise might have been neglected until great damage had been done. Examples without number, such as the above, might be given. Enough has been said to show plainly some of the ways in which school and country home are being brought into a closer and more intimate relation.

H. E. ESWINE,
Ext. Dept., Ohio College of Agriculture.

Alumni What The Busy Grads Are Doing

George L. Livingston, '09, is associate professor of agronomy at Ohio State. He was instructor in field crops at Iowa State College during 1909-10, and during the next year he was in the field crops service of the Ohio State Extension Department. Two years were then spent in the agronomy de-



partment. In 1913 Prof. Livingston was given a leave of absence to take post graduate work. Two semesters were spent at Cornell University and one at Halle-Witenberg University, Germany; crop improvement and crop breeding being the subjects to which he gave special attention. At the beginning of the school year, 1914, he resumed his professorship in the agronomy department. "Field Crop Produc-

tion," a text book by Prof. Livingston, appeared in April, 1914. It is one of the Rural Text Book Series.

I. S. Cook, '06, for the past three years has been head of the Department of Agronomy at the West Virginia University and Agronomist of West Virginia Experiment Station located at Morgantown. Many problems concerning the practical activities of farm work have been worked out by Mr. Cook and aside from the regular routine of agronomy work he has spent much time on the subject of renovation of pastures. This is an important problem in that state and special attention is being given to it.

O. M. Johnson, '08, Associate Professor of Farm Management at West Virginia University, has been granted a leave of absence in order to study rural economics and phases of farm management at Madison, Wisconsin. He will return to his duties early next year.

J. F. Walker, '14, is instructor in horticulture at Westtown Boarding School at Westtown, Pa. This is a co-educational preparatory school of about 250 students which puts especial emphasis in the teaching of horticulture. Much practical work is required—about 75 acres of fruit trees are used as a laboratory for the students, and 40 acres is used for trucking. Horticulture is a new subject in the curriculum but a large number of the boys are taking it.

W. W. Slate, '09, is head of the agronomy department in the agricultural college at Storrs, Conn.

E. J. Kinney, '08, is head of the agronomy department of Kentucky University at Lexington, Ky.

R. R. Buchanan, '14, is agricultural instructor in the agricultural high school at Brown Valley, Minn.

J. W. Ray, '13, is science instructor in the high school at Greensburg, Ind. He has introduced a two-year course in agriculture in the high school which is very popular with the students.

S. C. Hartman, '08, a successful stockman and farmer of North Fairfield, Ohio, was among those who attended the Institute Workers' Normal at Ohio State. He is active in the institute work and will be on force of speakers this fall and winter.

B. A. Williams, '14, former business manager of The Student, was married to Miss Marie Mighton on October 1. They will reside near Painesville on the Williams farm.

E. F. Rinehart, '10, has been changed from the extension service of the University of Idaho and will do special livestock reclamation work for the U. S. Department of Agriculture. His headquarters will be located in the west, probably at Boise, Idaho.

H. D. Drain, '12, has changed from high school work at Mountain Lake, Minn., to instructor in dairying at Mississippi Agricultural College.

H. C. Ramsower, '06, professor of Agricultural Engineering at Ohio State, announces the arrival of Harry Clifford Ramsower, Jr., on October 26, 1914.

H. R. Stillman, '14, and wife (nee Miss Hattie Burton) were visitors at the Ohio State-Wisconsin game. They live near Andover, Ohio, where Mr. Stillman is engaged in dairy farming.

S. H. Ruddell, '12, was a recent visitor on the campus. He and his brother are farming a large tract of land at Parkersburg, W. Va.

E. P. Reed, '14, is Assistant Agronomist at the New York Experiment Station at Geneva, N. Y.

T. B. Jobe, '12, (Spl.) is practicing general farming on the home farm near Cedarville, Ohio.

Karl D. Hirn, '14, and Miss Emma Grosling were married on October 20, 1914. They will live at Spencerville, Ohio, where Mr. Hirn is interested in general farming.

C. J. Windau, '14, was a recent visitor on the campus. He is interested in the retail fruit business at Port Clinton, Ohio.

Paul Geiger, '14, is farming near Hebron, Ohio. He is making a specialty of hogs and cattle.

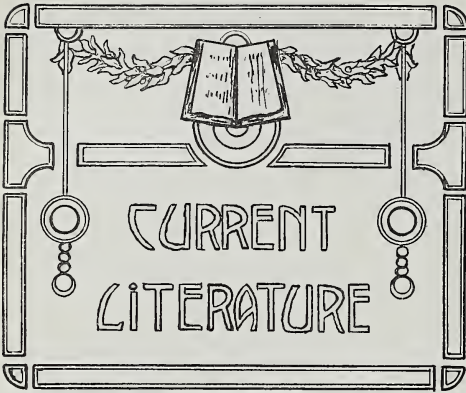
"Red" Marshall, '13, is teaching agriculture at Bluffton College and managing the home farm near Bluffton.

Ralph Jordan, '14, is making a specialty of onions and celery on a truck farm at Creston, Ohio.

C. A. Gearhart, '13, is on the force of Ohio institute speakers and attended the Institute Normal held at Ohio State October 22-24.

Malon Yoder, M. S., '14, has charge of the grain standardization laboratories of the U. S. Department of Agriculture at Portland, Ore.





“Vegetable Gardening” by S. B. Green was prepared primarily for the school of agriculture of the University of Minnesota. A late revision brings the book entirely up to date in regard to new machinery, new methods of culture, new remedies for insect and plant diseases and the varieties of plants that have been developed. Such subjects as location, soils, manures, tillage, seed sowing and transplanting, hot beds and green houses, insects and their control, marketing, exhibiting are treated in a general way. 335 pages, illustrated. Cloth, \$1.00. Webb Publishing Co., St. Paul, Minn.

“Rural Improvement” by Frank A. Waugh. Every rural district needs better roads, better school buildings and grounds, better farm planning, better public buildings and other public conveniences. This book presents a rational and comprehensive study of the principles on which these improvements are based, and while it is an appeal for the country beautiful, it gives, first of all, a method for making the country convenient, sanitary and efficient. 320 pages. Cloth, net \$1.25. Orange Judd Co., New York.

“Management and Feeding of Sheep” by Thos. Shaw, is a very com-

prehensive work intended to meet the needs of the farmer, the flockmaster, and the student of agriculture. Several books have been written on sheep, but in all of them breeds are discussed which of necessity excludes much that is important with reference to management. This work covers every phase of the same and with sufficient completeness. 500 pages. Net \$2.00. Orange Judd Co., New York.

“Soil Management.” Prof. F. H. King, whose wide experience as a skillful teacher and as a pioneer in this country in the study of soil physics has enabled him to sum up the results of his investigations and experience in the different phases of soil management in this work. It is thoroughly practical and is presented in simple language that the general reader will be able to understand. 303 pages. Cloth, net, \$1.50. Orange Judd Co., New York.

“High School Agriculture,” by D. D. Mayne and K. L. Hatch. This book is intended to arouse a real interest in the theory and practice of agriculture. The language is simple and presents an interesting introduction to all the natural sciences and directs the mind of the student inquiringly toward the further study of the problems of these involved sciences. It answers in the very beginning the proper question of the boy, “Of what use is the study of chemistry, of botany, and of zoology?” American Book Co., Cincinnati.

“First Principles of Agriculture.” The authors of this book, Goff & Mayne, have succeeded in producing a book simple enough to be placed as a text in the hands of the pupils in the high grades of the rural schools, yet one which covers thoroughly the numerous

departments of our complex agriculture. Many simple experiments are placed at frequent intervals to demonstrate the operations of the numerous phenomena. 266 pages. Cloth, \$0.65. American Book Co., Cincinnati.

“Modern Methods of Testing Milk and Milk Products,” by L. L. Van Slyke. This is a clear and concise discussion of the approved methods of testing milk and milk products. All the questions involved in the various methods of testing milk and cream are handled with rare skill and yet in so plain a manner that they can be fully understood by all. The book should be in the hands of every dairyman, teacher or student. Illustrated, 214 pages. Cloth, net \$1.00. Orange Judd Co., New York.

“Forage Crops and Their Culture,” by C. V. Piper. This is a new book of the Rural Text-Book Series and is a practical treatise on the various phases of production of each of the forage crops grown in America today. The bringing together of the scattered results of American research with some reference to those of Europe reveals to the student the phases of the subject which need further investigation, while at the same time its attractive subject matter and interesting facts should make it a popular book with the farmer. Illustrated, 618 pages. Price, \$1.75. Macmillan Co., New York.

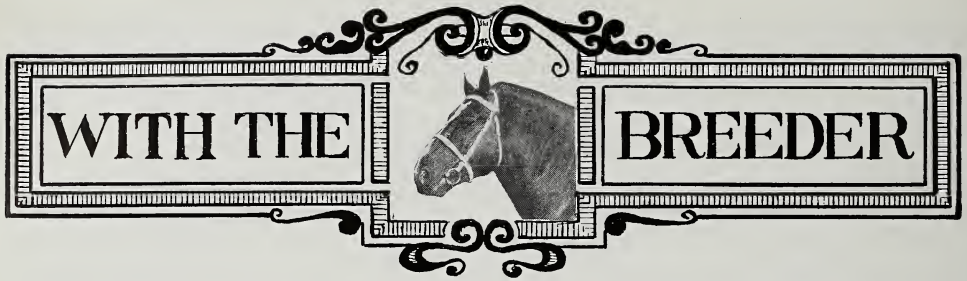
“Soiling Crops and the Silo,” by Thomas Shaw. This book treats of the growing and feeding of all kinds of soiling crops, the conditions to which they are adapted, their plan in a rotation, etc. It is especially designed to meet the needs of dairymen when providing green food for their stock. It

furnishes excellent information on the building of silos and the feeding of ensilage. Illustrated, 364 pages. Cloth, \$1.50. Orange Judd Co., New York.

“Farm Development” is a book from the pen of Willet M. Hays, whose point of view in compiling this work has been that of a common farmer. It involves practical discussions relative to the selection and development of the farm and is adapted to the needs of the farmer’s home library as well as a text for the agricultural high school and the advanced classes of agriculture in the rural district school. Illustrated, 391 pages. Cloth, net, \$1.50. Orange Judd Co., New York.

“Grasses and How to Grow Them,” by Thomas Shaw. It is the aim in this book to discuss all the grasses at present found in the United States and Canada possessed of any considerable economic value. These discussions include the characteristics of each kind of grass, its adaptation to climate and soil, place in rotation, seeding and harvesting. The book is written from the standpoint of the agriculturist rather than from that of the botanist, which makes it a book equally valuable to the farmer and student of agronomy. Illustrated. Price, \$1.50. Webb Publishing Co., St. Paul, Minn.

“A Text-book of Grasses,” by A. S. Hitchcock. The work is primarily a text-book, yet some technical information is included which also makes it valuable as a reference book. The plan of the work is unique in that the subject matter is divided—one part treating of the economic phase and the other of the systematic phase of agrostology, with the chief emphasis on the latter. Illustrated, 276 pages. Price, \$1.50. Macmillan Co., New York.



Castlemains Nancy 4th, an Ayrshire two year old, established a new world's record for her class when she recently completed a year's production of 14,494.8 pounds of milk containing 574.03 pounds of butter fat. Castlemains Nancy 4th is sired by Imported Lessnessock Douglas Monarch, and was bred and owned by Percival Roberts, Jr., of Penshurst Farm, Narbeth, Pa.

XXX

Except for a very few coming from England, importation into the United States of pure bred draft horses for breeding purposes has been practically stopped by the outbreak of the European war. For several years previous, from 2,500 to 4,000 stallions and mares have been brought annually into this country. In the opinion of experts in the United States Department of Agriculture, however, the standard of draft horses in America will not suffer from the interruption of these importations. There is a sufficiently large amount of pure blood already in the country to answer all requirements and the American draft horse will now be given an opportunity to demonstrate its own qualities. Hitherto a certain fascination has hung over the word "imported" which had a marked effect upon prices.

There is no apparent reason why American breeders cannot produce the equal if not the superior of the draft horses in Europe. The principal breeds are now thoroughly established

in the United States. Their various characteristics and merits are discussed in a new bulletin published by the United States Department of Agriculture under the title of Farmers' Bulletin No. 619, "Breeds of Draft Horses." This bulletin deals with the Belgian, Percheron, French Draft, Clydesdale, Shire and Suffolk types.

XXX

The American Meat Packers' Association recently met in Chicago and discussed problems of vital importance to the packing industry. The chief question was the shortage of raw material. There is a shortage of approximately 50,000 car loads of cattle, hogs and sheep since January 1st at the principal markets of the United States compared with the corresponding period of last year. Packers realize that domestic production must be stimulated for there is a marked scarcity of young cattle and sheep on the western breeding grounds. The corn belt feeders have been obliged to resort to the use of inferior stock for it has been exceedingly difficult to replenish their feedlots. All this proves that beef production is not keeping pace with the demands of our rapidly increasing population, and it is predicted that the year 1915 will reveal the greatest scarcity of cattle and sheep ever known in this country.

XXX

Many Ohio State men who attended the Delaware County Pumpkin show,

October 9th and 10th, declared that it was a great success. In spite of the rainy weather the attendance and number of entries exceeded those of previous years. The main feature of the show was the live stock exhibit especially that of the horse department. The light harness competition was keener than usual and some interesting saddle horse exhibitions were given by the White Star Stock Farm. The Percheron exhibit was larger than in former years and noted horsemen declare this the best show of a single county east of Illinois. A special feature of the show was the futurity which was in charge of the Delaware County Percheron Breeders' Association. Purses amounting to \$50.00 each were divided in both stallion and filly foal classes. W. E. Prichard of Ottawa, Ill., an experienced International judge, made the placings.

XXX

W. M. Staley of Marysville, reports a very successful season with his Merinos. Several individuals of his flock have been undefeated during their tour of Ohio, Illinois and Michigan State Fairs. Mr. Staley has several times tied the ribbons on Merinos at Columbus, and strongly advocates that especial emphasis be placed upon type. The A, B and C types each have their field of usefulness, but should be prop-

erly classed without overlapping by Merino breeders and awarding judges.

XXX

The Cheviots of White Stock Farm have returned from their tour of fairs and are receiving the finishing touches, preparatory to the final International contest. R. and W. Postle report a very successful season, having won five firsts, six seconds and two championships at Wisconsin and taking everything at Springfield, Illinois.

XXX

An outbreak of the much dreaded foot and mouth disease was reported in this country on October 16th by an experienced veterinarian in the Bureau of Animal Industry. The disease was found on about forty farms in the vicinity of Niles, Mich., and on several farms in Laporte County, Ind. These counties and adjoining counties were promptly quarantined and every method is being employed to prevent the escape and spread of the trouble. European countries have spent millions in control of the disease and it is not yet entirely suppressed. Its spread should be stopped in this country by all means if our cattle raising industry is not to be seriously affected. The origin of the outbreak was probably from imported hides used in leather belt factories at Niles, Michigan.





NOVEMBER NEWS NOTES

Nearly one hundred institute speakers attended the Institute 'Workers' Normal, held on the campus October 22-24. The purpose of the normal was to acquaint the institute speakers with the college activities and to conduct a general plan of procedure for the institutes held this fall and winter. Formerly the normal was held in the State Capitol but owing to the added facilities in the new agricultural building the University was chosen and will be the meeting place in the future.

The sessions were given to special agricultural phases; viz, soil, livestock, soil fertility, field crops and markets. Each subject was treated by specialists, opportunity being given for general discussion. Two sessions were held in the Hall of the House of Representatives—those dealing with agricultural problems and the services of the agricultural college in advancing farming conditions. Director C. E. Thorne, B. E. Carmichael, Prof. C. S. Plumb, Dr. Alston Ellis, Dr. W. O. Thompson, Prof. George Livingston, W. W. Farnsworth and Chas. E. Basset of the U. S. Department of Agriculture, were among the principal speakers. A panoramic photograph, luncheon at Ohio Union and a trip over the university farm were features of the Normal.

Dean H. C. Price, Director C. E. Thorne and Dr. W. O. Thompson re-

cently campaigned a number of counties which voted on the establishment of county experiment farms November 3. Automobile tours were arranged and about 20 points in each county were visited where meetings boosting the proposition were held. Fifteen counties will vote on the proposition which will mean that the county or counties adopting it will be bonded from twenty to thirty thousand dollars. This will go towards the purchase and equipment of the farm. The state provides that if the county furnishes a suitable farm the county agent and his expenses and salary will be met from state funds and not from the county. Five per cent of the voters of the last election must petition for the proposition before it can be voted upon.

The counties voting on the establishment of county farms this fall are: Montgomery, Green, Madison, Butler, Van Wert, Allen, Putnam, Auglaize, Summit, Mahoning, Trumbull, Scioto, Lawrence, and Tuscarawas. The granges, farmers' clubs and different agricultural organizations were instrumental in bringing about the proposition and conditions indicate that it will pass in nearly every county.

Two new gas engines and a pumping and lighting outfit have been added to the equipment in the farm machinery

laboratory. One is an 8 H. P. Cushman engine weighing less than 300 pounds; and the other, a 4 H. P. Bessemer engine.

The pumping and lighting outfit is a Kewanee. It consists of a 1 H. P. water-cooled engine with a capacity of 350 gallons per hour against 125 pounds pressure; a 140 gallon pressure tank; a 60 volt generator; a 16 celled storage battery and a type D switch board arranged to charge and discharge the battery at the same time. The battery is capable of supporting ten 16 candle-power tungsten lights for 8 hours without the engine and generator. Automatic switches are provided on the storage battery and pressure tank so that both can be filled and shut off independently of the other. The farm machinery laboratory will be lighted by the use of the lighting outfit.

The Dairy Department of the College of Agriculture is directing the installation of a new dairy plant and the building of a new dairy barn on the farm of the State Hospital for the insane at Athens. One hundred and twenty cows are now being milked at the hospital farm. The new barn will accommodate 200 cows and is strictly up-to-date and modern in every respect. The dairy plant is thoroughly modern and is fully equipped to handle all the milk produced on the farm. It is planned that all milk, butter, and cheese that is consumed in the hospital will now be produced and made at the institution. This not only insures fresh, wholesome dairy food for the inmates of the institution, but affords employment for those who are able to work and will be a great saving for the state, as \$60.00 a day is now being paid for butter.

For the purpose of getting better acquainted and developing a larger and more congenial college spirit, Ohio Union was thrown open from top to bottom for the students and faculty of the agricultural college on Friday evening, October 16. Each floor was devoted to some form of amusement—fortune telling, style shows, hypnotic stunts and other features too numerous to mention. Rustic decorations made every one feel that a regular old-fashioned husking bee was on hand and every one contributed a part in the disposal of the apples, cider and doughnuts. According to the management "Open Night" will be featured several times during the year.

The enrollment in the three-year course of agriculture numbers 163. One half of the students registered are high school graduates and a small per cent are above the college age but the average is 20 years. The course may detract somewhat from the enrollment in the four year course but it will add considerably to that of the agricultural college.

Special emphasis is being laid on the fact that work in the short course cannot be taken with the expectation of transferring with credit into the four-year course later on. At the end of three years a certificate of completion will be given. Specialization in animal husbandry, farm crops, dairying or rural economics will be offered in the third year.

Prof. Geo. Livingston recently addressed the members of the Agricultural Society giving an excellent talk on his observations of student life in Germany. "The German students," said Prof. Livingston, "wear high hats, high collars, a mustache, if possible,

and carry a cane. They do not carry books for this is regarded as a disgrace and note books are never seen."

They are very eager for knowledge, however, and secure this through experiments and demonstrations rather than text books. Displeasure is expressed by violent stamping of the feet. Dueling is practiced—each student being required by the student regulations to fight about 14 duels during his college career. The scars left by these sword combats are regarded as signs of ability and service.

Prof. Clinton, of Cornell University, recently lectured before the classes in rural economics on the subject of agricultural extension work. He is making a study of the different plans and practices used by colleges and experiment stations in many parts of the United States. He laid much emphasis on the fact that county agents as factors in agricultural development had done much to advance agricultural conditions. Problems on distribution and production, according to Prof. Clinton, are the really important questions before the farmer of today.

"Resolved, That the Federal Government should own and control the telephone and telegraph lines in the United States" is the subject for the debate between Townshend and Athenian literary societies this year. The same subject will be used for the Varsity Debate.

Live stock from Ohio State University to be shown at the International Exposition will be as follows: In the fat cattle some pure bred Aberdeen Angus and Shorthorns will be entered while some grades and cross breeds will compete in the carcass contest.

The University will probably be best represented in the sheep classes, individuals of the Shropshire, Hampshire, Southdown and Cheviot breeds being entered.

The hog contingent consists of six Berkshire barrows, six Duroc Jerseys, three Tamworths, and some individuals for the carcass contest. The excellent condition of the animals at present should demand attention at the Show and Ohio State should again receive a large share of the prize money.

Ohio State University was well represented at the National Dairy Show by an exhibit of the famous dairy cattle of this state. At the Ohio booth were the trophies and picture of the Dairy Team at the Show this year. G. D. Norton of the class of '14 had charge of the exhibit. Missouri, Purdue, Pennsylvania and Minnesota also had exhibits at the Show.

Judging contests, and exhibits of the work of the Ohio Experiment Station, as well as exhibits of corn, wheat, oats and small grass seeds will be among the attractions at the Fourth Annual University Corn and Grain Show to be held during Farmers' Week at the university. Present indications show that this will be the largest exhibit of its kind ever given at the college. Prizes from \$25 to \$30 have been offered for the best ten ears of corn of each variety, best samples of wheat, oats, and each of the small grass seeds. Stanley Sink is manager of the show and H. U. Simmermacher, secretary.

A. J. Bishop, C. J. Fawcett, D. W. Williams, K. G. Hancher and E. R. Hoftzyer are the men who will represent the Ohio College of Agriculture in the Judging Contest at the Inter-

national Live Stock Exposition to be held at the Union Stock Yards, Chicago, November 28.

HORTICULTURE.

A large class is enrolled in the course of Vegetable Canning. This class is securing practical experience in the University canning plant. The plant is equipped with a large retort and boiler which has a capacity of 200 to 500 quart cans a day. There are also three large family retorts, and six individual retorts. In addition all the necessary accessory equipment is included, such as soldering irons, and thermometers. Thermometers are used throughout the process of cooking to determine and regulate the gradual rise of the temperature in the substances while cooking. This fall corn, beans, and tomatoes are being canned. Next year, however, the plant will be increased so as to include catsup, cider and apple butter. The work of the class is under the direction of Prof. L. M. Montgomery.

Prof. Wendell Paddock spent several days of last month visiting orchards in Massachusetts, New Hampshire and New York. At Antrim, New Hampshire, Prof. Paddock judged the apple show held under the auspices of the New Hampshire Horticultural Society, and also gave lectures at a meeting of the society. While at Antrim he was the guest of Prof. Joseph Gourley, '08. At Amherst, Massachusetts, he visited the college, and also the farm of E. D. Waid formerly in the extension department at Ohio State. Mr. Waid this year had a yield of 2400 bushels of potatoes on six acres of land, and another three acres that yielded six tons of onions.

The officers of the Horticultural Society for the year are: W. W. Ellenwood, President; Donnell Leyda, Vice President; Brooks Drain, Secretary and Treasurer. The meetings this year have been unusually interesting and the membership is the largest in the history of the society.

The date of the University Apple Show, which is held under the auspices of the Horticultural Society, has been set for December 3-4. Plate entries this year will consist of the following varieties: Baldwin, Ben Davis, Arkansas Black, Delicious, Ensee, Gano, Hubbardson, Mammoth, Black Twig, Northern Spy, Pewaukee, Rambo, Rome Beauty, Roxbury Russet, King, Grimes, R. I. Greening, Stayman, Sutton, Snow, Winesap, York Imperial, Pryor's Red, Paradise Sweet, Yellow Bellflower, Stark, Fall Rambo, Wagener, Salome, Tolman Sweet and Fallawater. No entrance fee will be charged, but all apples entered will become the property of the Horticultural Society and will be sold at auction the last night of the show. The total value of premiums given at last year's show was close to two hundred dollars; the value this year will exceed this by a large amount.

Plans are being made for an exhibit of twice the size of last year. The show this year will be held in the new Horticultural Building.

The Horticultural Department is in receipt of a fine collection of the family *Pyrus* from the Arnold Arboretum of Harvard University at Boston. The collection consists of eighteen forms of the primitive species of the pear and will be shown at the Apple Show.

PROF. W. J. RADER'S PRIVATE ACADEMIES OF DANCING



Dance Correctly

NEIL AVE. ACADEMY,

647 Neil Ave., Phones—Citiz. 4431; Main 6189.

Beginners' Classes organize Wednesday evening, November 11th, and Friday evening, November 27th, 7:30 o'clock. First lesson.

Second Term Class Monday evenings. List introduction. Reception (Open) Nights, Thursdays. 25 cents.

OAK ST. ACADEMY,

827 Oak St.—Citizens 7105.

A strictly private place for Fraternity, Sorority and Club Socials.

TUITION—Gentlemen, per term of ten lessons, \$5.00; Ladies, \$4.00. Private lessons, \$1.00, six for \$5.00. Tuition can be paid \$1.00 per week until paid. Private lessons can be had afternoons or evenings. The Waltz, Two-Step and One-Step taught in one term.

NEIL AVE. PAVILION,

Neil Ave., Between Goodale St. and Poplar Ave.

Open Friday and Saturday evenings.

Academics can be secured for Fraternity and Society Socials.

FRATERNITIES AND BOARDING CLUBS
Always Find Our

Meats and Groceries

STRICTLY FIRST-CLASS.

ABERNATHY BROS.

1609 HIGHLAND STREET

Citizens Phone 16504

Bell, North 857

MARZETTI

Restaurant

1548 NORTH HIGH ST.

Headquarters for "Ohio State" Boys.

STRICTLY HOME COOKING.
FAMOUS PORK SANDWICH.
POOL.

STUDENTS' SUPPLIES

MEN'S FURNISHINGS

High at E. 11th **Maddox & Kilgore** High at Goodale

The Agricultural Student and The
Breeder's Gazette one year
for \$1.75

HELLO WINTER!

Greet the cold weather with a warm smile and a warm overcoat.

Prepare for Jack Frosts's arrival now and order your Storm Coat before it's too late.

We're making some classy Winter Overcoats with convertible collars for some of the fellows you know in town.

Why not let us make one up for you?

In our line of "So-Different" Fabrics you'll find a range of colors that will make it an easy choice for you.

The "So-Different" Tailory

C. H. Bradley, Propr.

1541-3 NORTH HIGH STREET

The McDonald Hardware Co.

FIFTH AVE. AND HIGH ST.

We are always pleased to do business
with O. S. U. boys.

MEET ME AT THE

Varsity Barber Shop Cigar Stand and Pool Room

The Students' Rallying Place

1585 NORTH HIGH ST., Opp E. 11th Ave.

Phone, North 59.

C. BLOOM

THE TAILOR

CLOTHES FROM \$18 UP

Pants sponged and pressed..... 10c
Suits sponged and pressed..... 40c
Pants cleaned and pressed..... 40c
Suits cleaned and pressed.....\$1.40

1986 NORTH HIGH STREET.

BLACKWOOD, GREEN & CO.

Hardware

Furnaces, Stoves and Kitchen
Furnishing Goods
Slate and Metal Roofing

624 N. HIGH ST.,

COLUMBUS, O.

ORR-KIEFER**COLVMBVS, O.****Orr-Kiefer Studio Co.**

199-201 SOUTH HIGH STREET

Artistic Photography

"Just a little better than the best"
SPECIAL RATES TO STUDENTS

COLVMBVS, O. *We Frame Pictures of all kinds—RIGHT*

*The "Student" Laundry**Corner 11th Ave. and High**Special "Office" Rates***PROGRESS LAUNDRY*****Dry and Steam Cleaning, Pressing***

Our Tailoring Department is complete. 500 Patterns on which we can
 save you money.

Five Cents**Five Cents**

Bring this Coupon and Five Cents
 to

BROSMER'S

Two Stores

N. HIGH ST., Opp. E. 11th AVE.
 CORNER 4th ST. and 14th AVE.

and get one-half pound of Brosmer's
 Famous Butter-Scotch Kisses.

NO BETTER CLOTHES THAN**MENDEL'S****—AT ANY PRICE—**

**SUITS MADE AND GUARANTEED
 TO FIT, FROM \$18 to \$40.**

MENDEL, The Tailor

545 NORTH HIGH STREET
 Few Doors South of Goodale St.

Ohio Union Barber Shop**Stop in and Meet BILL, the Barber**

VET. MED. '18

Basement of Ohio Union

The Euclid Academy of Dancing

Cor. High St. and Euclid Ave., 5 Minutes from O. S. U.



**Weekly Reception Thursday Evenings
Beginner's Class Monday Evening**

TUITION.

Gentlemen, per term of ten lessons.....	\$5 00
Ladies, per term of ten lessons.....	4 00
Private lessons, \$1.00; six for.....	5 00

Private lessons can be had any hour—morning, afternoon or evening.

We guarantee to teach you to dance in one term of private or class lessons

Academy can be secured for Private Parties, Fraternity Hops, Etc.

PROF. H. J. GUERR

Phones: Citiz. 8584; Bell, North 1759.

DROP IN, O. S. U. BOYS.

GRUMLEY & CASE CONFECTIONERY

Try our Soda and Sundries—the Best Ever.

Cigars and Post Cards, Lowney's and Morris' Candies, Soft Drinks, Stationery and Student Supplies.

We take orders for Ice Cream.
Give Us a Call.

2077 NORTH HIGH STREET.

UNIFORM REMODELING

Caps, Service Stripes and Pants Stripes Made
While You Wait.

DRY CLEANING AND PRESSING.... 90c
PRESSING 25c

SAM ROSEN, 1574 N. High



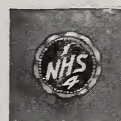
SOME CLASS PINS

MADE BY

BASCOM BROTHERS

College, Class, Fraternal Emblems and
Stationery.

Up stairs next to Maddox & Kilgore



HAVE THE BEST

Visit The Old Reliable

Baker Art Gallery
COLUMBUS, O.

State and High Streets

The largest, finest, and without doubt the finest equipped Gallery in America for producing everything known to the art.

SPECIAL O. S. U. RATES

Stockmen:

Let us help you *Increase Your Profits* by increasing the value of your products. Write for Information

The Indianola Printing Company

Prof. C. S. Plumb, Pres., Dept. of Animal Husbandry, Ohio State University.

O. H. Lynn, Sec'y and Manager.

Dr. D. S. White, Treas. Col. of Veterinary Medicine, Ohio State University.

1616 NORTH HIGH STREET.

COLUMBUS, OHIO

Block-Crane Floral Co.

C. F. BLOCK

"The College Flower Shop"

GEO. CRANE

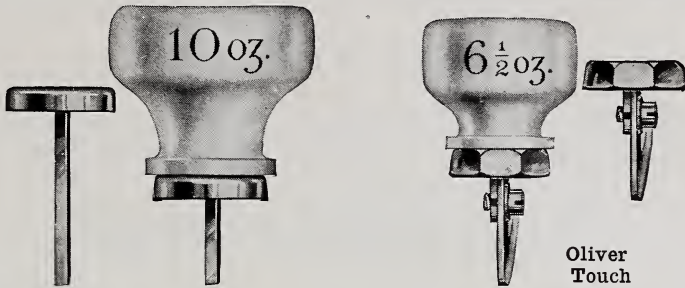
OPPOSITE NEW MUSEUM

We can take care of your orders from out of city by calling Long Distance 13996

Has Your Subscription Expired?

Do not neglect to renew promptly; this will prevent any delay in receiving your paper.

Please mention THE AGRICULTURAL STUDENT when writing advertisers.



Typewriter Touch by Actual Weight

Now mark the story this test tells. To operate the average typewriter requires a 10-ounce pressure on the keys. Some $7\frac{1}{2}$, some $13\frac{1}{2}$. Mark that the Oliver writes at $6\frac{1}{2}$ ounces—scaled down to 50% lighter. And it wins its leadership in other points, too.

Here again a service to the world—the new model Oliver—the Silent Seven. A benefaction to all mankind. Labor of thousands lightened. With touch so sensitive that experts marvel—the weight of your finger, tapped on the key.

You Can Prove It

Place some small, flat object on a key of the average typewriter. Add enough objects to make the key write. Now perform this experiment with the Oliver No. 7, set at equal tension. Then weigh the two sets of objects. Your nearest druggist can do so if you have no handy means.

Others have made this demonstration. The result is as interesting as it is conclusive.

Speed Test

Many are misled by the operator's performance. Oliver capacity exceeds all human pace. And before it leaves our factory we run each typewriter by mechanical tester—each key at a speed no human hand can reach.

Yet, without once piling the letters.

Easy for Novice

Now all who can touch a key can write at once. Start the first day your Silent Seven arrives. No schooling necessary—no skill. Just the normal practice that comes as you operate.

The Silent Seven

This brilliant triumph has all our epoch-making inventions—visible writing, visible reading, fewest keys, and Printype if desired.

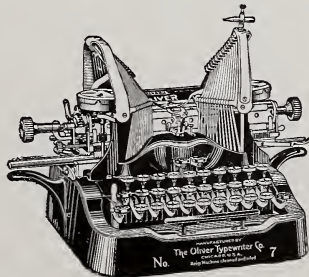
To these have been added the cushioned keyboard, anchor-keys and automatic improvements. With the new paper holder no care is needed—your sheet cannot crumple.

The return of the carriage advances your paper to another line—our famous automatic spacer. It prevents you writing on the line just written. Now the hardest thing to do with the Oliver is to make mistakes.

17 Cents a Day

Our popular purchase plan applies to the new Silent Seven. And we give you by careful estimate 25% more value! Yet we have not increased the price one penny.

The OLIVER 7 Typewriter No. 7



The Standard Visible Writer

De Luxe Book Free

It fully pictures and describes the Oliver. It coaches you on points worth money if you ever use or own a typewriter. A postal brings it by return mail, free. Write today.

The Oliver Typewriter Agency 85 N. THIRD ST.
COLUMBUS, OHIO

Announcement

H. N. Winkler, Class
of 1914, has accepted
a position as special
agent in Central Ohio
for The Union Central
Life Insurance Co.



Three New Thirty Pound Daughters

For Our Junior Sire
Pontiac Aaggie Korndyke

This gives him six 30 lb. daughters, so that he now has more 30 lb. daughters than any other living sire. He also has the distinction of being the only sire living or dead that ever had six or more 30 lb. daughters before he was nine years of age. Only two of the sires that are dead have ever had more 30 lb. daughters than he now has.

By combining the blood of Friend Hengerveld De Kol Butter Boy and Pontiac Aaggie Korndyke with that of our great foundation cow, Euphrasia A., we have attained greater and more wonderful results than have ever been secured by any other combination of blood.

The Maplecrest Stock Farm Company

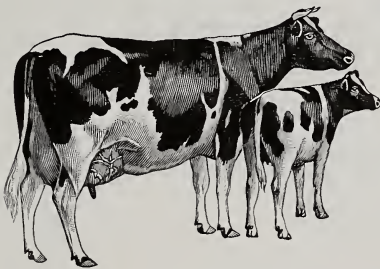
Successor to DAN DIMMICK & BRO.

Telephone Connection between Farms and Office.

OFFICE AT KALAMAZOO, MICH.

FARMS AT E. CLARIDON, OHIO.

Kindly address all correspondence to Kalamazoo, Mich.



Purebred Registered HOLSTEIN CATTLE

Fourteen thousand one hundred and five dollars and fifty cents in prize money was divided amongst 225 breeders of pure-bred registered Holstein cattle during last year. This is a part of our system of Advanced Registration of milk records. The prizes, 673 in number, range from \$40 to \$5. Breeders are limited to three prizes in each of our four division. Wealthy owners have no advantage over those of limited means. Here is an additional reason for purchasing pure-bred registered Holstein cattle.

Send for FREE Illustrated Descriptive Booklets
HOLSTEIN-FRIESIAN ASSO., F. L. Houghton, Sec'y,
Box 154, Brattleboro, Vt.

Please mention THE AGRICULTURAL STUDENT when writing advertisers.



Shropshire Sheep

Bred by

W. F. Palmer & Son
PATASKALA, OHIO.

We have some extra good home bred yearling rams and ewes bred to Imported Tanner or Butter rams which we will offer at reasonable prices for fall delivery. Come and look over our flock, on Newark Traction line, near Wagram Stop.

Minor's Fluid

A GUARANTEED

SHEEP AND HOG DIP

If your dealer will not supply you,
write us direct.

The W. E. Minor Disinfectant Co.
328 Champlain Ave., CLEVELAND, O.

Polled Herefords

Nothing gone but the horns.

Hampshires

The Coming Breed.

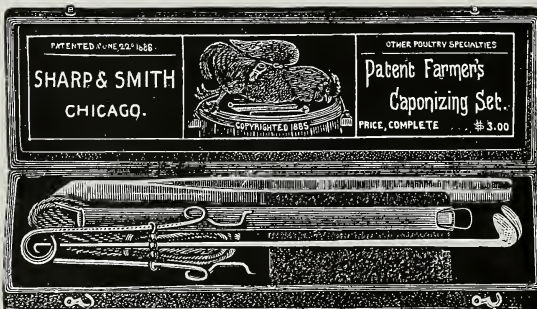
Ashland Stock Farm

Write for Information to
E. FIELD & SON, CAMDEN, OHIO

SHARP & SMITH

Manufacturers of

High Grade Veterinary and Surgical Instruments



Including

**DEHORERS,
MILK TUBES,
CAPONIZING SETS,
IMPREGNATORS,
DOSE SYRINGES, Etc.**

Illustrated Catalogs sent
Free, Postpaid on
Request.

155-157 N. MICHIGAN BLVD.

CHICAGO, ILLINOIS

Choice Pure Bred Live Stock

is bred by the Animal Husbandry Department of the

Ohio State University

We breed Percherons, Clydesdales, Hackneys, Shorthorns, Jerseys, Holstein-Friesians, Guernseys, Shropshires, Merinos, Berkshires, Duroc-Jerseys, Large Yorkshires and some others. We often have surplus stock for sale at a reasonable price.

Address, DEPARTMENT OF ANIMAL HUSBANDRY,
Ohio State University, Columbus, Ohio.

BUY FROM THE MANUFACTURERS
HIGH GRADE
Veterinary Surgical Instruments
Each, Postpaid

2 oz. N. P. Dose Syringe.....	\$1.10
Per half doz., \$4.50; doz.....	8.00
Dehorners, \$6.50 to	14.00
Impregnators, \$3.50 to.....	6.00
Capon Sets, \$1.50 to.....	3.50

Write for Illustrated Catalogue and
Special Cash Prices.

HAUSSMANN & DUNN CO.
TEXT BOOKS AND SUPPLIES

708 S. CLARK ST. CHICAGO.

They're not short-lived **The Jerseys**



In 1913 eighteen Jersey cows were officially tested which averaged 12 years and 7 months of age. Their average milk production was 8617 pounds. Average butter fat, 387 pounds. One of these cows was over 18 years old.

Longevity, Constitution and Economic Production are Jersey characteristics.

THE AMERICAN JERSEY CATTLE CLUB
324 W. 23d St., New York City

BOARS AND GILTS



For sale at reasonable prices, the best lot of strong, lusty, big boned Duroc Boars and Gilts we ever raised. All of them immuned. They are just what we would want ourselves if we were introducing new blood, or starting a herd.

Write Now.

WM.H.ROBBINS. SPRINGFIELD OHIO.

THE FEED THAT FATTENS

HIGH GRADE COTTON SEED MEAL

GUARANTEED 41 PER CENT PROTEIN

Write, wire or phone for prices before buying.

THE WM. A. BURNETT CO., Bourbon Stock Yards, Louisville, Ky.

Established 1901



"Best Cow Feed We Ever Fed"

Thus writes the Reedy, W. Va., Produce Co. A dealer in Northern New York says: "Every person who has a cow in town swears by Dewey's Ready Ration. A large milk producer of Vermont says: "It has increased the milk flow several cans per day." A Vermont dealer reports wonderful results by one of the farmers using this ration in not only increasing the milk flow but after three weeks it increased the weight of the animal in good, healthy flesh. In the same letter the dealer says that certain other ready mixed rations, while producing a large flow of milk, seem to diminish the weight of the cows.

Dewey's Ready Ration is made for the dairyman who wants the highest quality and everything that goes to make up an ideal dairy feed. For samples and further particulars, write

THE DEWEY BROS. CO.
Box 577, BLANCHESTER, OHIO.

Ask for prices on mixed cars of Dewey's Ready Ration, Distillers' Dried Grains, C. S. Meal, Oil Meal, Mill Feeds, Hominy Feed, Gluten Feed, Scratch Feed, Horse and Mule Feed, Corn, Oats, etc.

New Silo

The Sugar Creek never-burst glazed tile Silo.

The Silo that has all dead air spaces.

The Silo that has reinforced steel bands laid in concrete every 20 inches in height.

You Write We Respond

**The Finzer Bros.
Clay Co.**

SUGAR CREEK, OHIO

Supplies for the Creamery or Farm Dairy

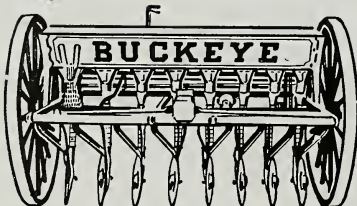
We have the newest and most complete dairy machinery on the market today.

OHIO CREAMERY & DAIRY SUPPLY COMPANY

124 WEST THIRD STREET, CINCINNATI, OHIO

BUCKEYE GRAIN DRILLS

*"The Buckeye
a wise buy"*



BUCKEYE DRILLS have many exclusive features to be had on no other Drill—features that mean much to the farmer. It is the only drill having the fertilizer hopper lined with galvanized metal; the only drill with a glass cone fertilizer feed. The Buckeye is the only drill that has a nested cone gear driver. The Buckeye is the drill with an absolute force feed that will sow all seeds accurately and put them in the ground at an even depth. Made in all styles and sizes. Go to your local dealer and insist on seeing the Buckeye Drill. Send for catalog.

*The American Seeding Machine Co.
INCORPORATED
Springfield, Ohio, U.S.A.*

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

THE BURKETT

THE PRESS SUPREME

The latest improved, most practical and most reliable Hay Press on the market.

Tracks with a standard gauge farm wagon.



This press meets the requirements for making light and heavy weight bales for which there is such a great demand.

The Burkett Motor Hay Press.

SEND FOR OUR ILLUSTRATED CATALOG—It describes our full line of motor and belt power presses.

The Burkett Manufacturing Co.

168 WEST SPRING STREET, COLUMBUS.

BE PROGRESSIVE

— BUY —

HIGH GRADE COMMERCIAL FERTILIZERS

The absolute "Measure of Value" of Acid or Rock Phosphate is the **cost per unit** of available phosphoric acid.

We manufacture and sell eleven brands of fertilizers. Our "Wheat Special" is the highest grade of acid phosphate sold in **OHIO**.

The M. Hamm Company

WASHINGTON C. H., OHIO.

Farmers! Students! Horticulturists!

Practice what our Colleges and Experiment Stations tell us:

HOME MIX YOUR FERTILIZERS

You can make at least \$6.00 to \$8.00 an hour mixing fertilizer. Can you afford to pay the manufacturer that much? Call or write us.

The Nitrate Agencies Company

McCUNE BUILDING, COLUMBUS, OHIO.

STUDENTS: See Stanley Sink, 1612 Highland St., Columbus, Ohio, for wholesale and retail prices.

High Grade Show and Commercial Printing



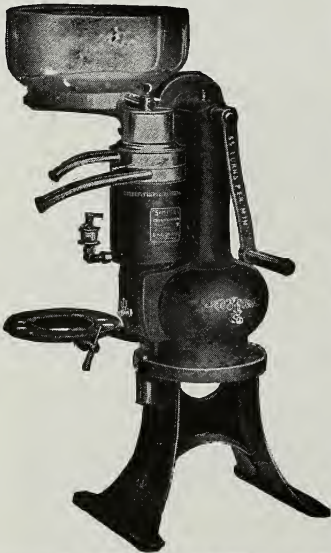
The "SIMPLEX" Link Blade Cream Separator

Improved Design

LIGHTEST RUNNING.

LARGEST CAPACITIES.

CLOSEST SKIMMING.



The Only Practical Large Capacity Separator

500 lbs. \$75.00 900 lbs. \$ 90.00

700 lbs. 80.00 1100 lbs. 100.00

D. H. BURRELL & CO.

LITTLE FALLS, N. Y.

Manufacturers of Creamery, Cheese Factory
and Dairy Apparatus and Supplies.

Also, B-L-K COW MILKING MACHINES.

Please mention THE AGRICULTURAL STUDENT when writing advertisers.



You can't afford a Cheap Crib

It takes four months of real hard work to secure a corn crop! To put this crop in an old-fashioned crib seems like throwing away money. Rats will feast on it; thieves are apt to get it; it may lose its vitality and is subject to loss by fire.

Let the **MARSHALL** PROTECT YOUR CORN

MARSHALL IRON CORN CRIBS furnish complete protection for your corn. They pay for themselves in a short time by assuring increased profits from your crop. Made of perforated galvanized iron that lasts a lifetime. Easily erected. Different styles and many sizes.

FREE "Corn Insurance" Let our catalog tell you more about the "MARSHALL" which is proving a wise investment with hundreds of progressive business farmers. Write for this instructive Free Book Today.

WALTER E. OSBORN CO., Commerce Bldg., Columbus, Ohio

Here is the Solution:



Spray Your Trees Early Any time this winter and early spring when the temperature is not below 40° F. you can spray with "SCALECIDE" and kill the scale, eggs and larvae of insects wintering on trees, as well as spores of fungi that can be reached by a winter spray. Prepare now for a good fruit crop next season.

"SCALECIDE"

TRADE MARK REG. U. S. PAT. OFFICE

will absolutely destroy San Jose and Cottony Maple Scale, Pear Psylla, Leaf Roller, etc., without injury to the trees. It costs less to spray an orchard with "Scalecide" than with Lime-Sulfur—and you secure better results. We back up this claim. Write today for free booklets—"Proof of the Pudding" and "Spraying Simplified".

Write to our Service Department for orchard supplies at money-saving prices.

**We are World Distributors for
Vreeland's "ELECTRO" Spray Chemicals**

and "Electro" Arsenate of Lead Powder (3%) which, used wet or dry, has no equal in strength or texture. Avoid imitations. B. G. PRATT CO., Dept. 15, 50 Church Street, New York City.

SUPERIOR GRAIN DRILLS

"The Name Tells a True Story."

Superior Drills are used in every grain growing country on earth wherever grain is grown.

It makes no difference what your seeding conditions are, you can rely on the Superior to do that work as it should be done. Superior Drills are sold under a warranty that absolutely protects the purchaser. Send for the Superior Catalogue. Read it carefully and then go to your local dealer and insist on seeing the Superior Drill.

"The Superior feed sows every seed."

Superior Drills are made in every style and in all sizes, from one horse up.

THE AMERICAN SEEDING MACHINE CO. INCORPORATED
SPRINGFIELD, OHIO, U. S. A.

CO-OPERATION Pays Most Money for Cream

Those who shipped their Cream to us during the past year received what equals about 3c above "Elgin" for the Butterfat delivered at Factory.

LET US EXPLAIN

Be one of our Co-operators this year. Start NOW.

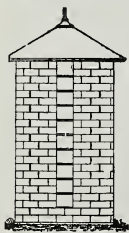
Make your next shipment to us. Remember, we "Pay the Freight."

The West Jefferson Creamery Co.
COLUMBUS, OHIO.

The Agricultural Student

is the magazine of every man in the Agricultural College. Are you giving it your hearty support?

LIKE THE "ROCK OF GIBRALTAR"



—"without a crack anywhere and keeping the ensilage perfectly, right up to the edge all around"—this is the statement of Mr. W. R. Spann, of Shelbyville's famous "Burr Oak" Farms, while speaking of his

Perfect Reinforced Cement Silos

Storms, wind and weather cannot destroy "Perfect" Silos. Made of everlasting cement blocks, reinforced with wire and steel rods. Absolutely fireproof. Guaranteed not to crack. Write for illustrated, descriptive booklet giving the opinions of leading farmers and dairymen.

REPRESENTATIVES WANTED. Write for terms and free booklet.

The PERFECT REINFORCED CEMENT SILO & CISTERN CO.
DELAWARE, OHIO.

General Sales Agents, Hocking Valley Ensilage Cutters.

We Need You and You Need Us, Mr. Dairyman

We want the milk and you want the money. We give you the advantage of the highest prices—we pay 1c above Elgin market for butter-fat and send back your pay check usually the next day after the cream is shipped. We can do this because our DAISY BRAND BUTTER finds ready sale, being a good, fine-flavored butter made by exclusive processes, most exacting in sanitary methods and manufactured in vast quantities in our three big plants at

Toledo Columbus Lima

Cut out and mail the coupon you need. One coupon will bring you a supply of free tags and seals. You want to use that one if you have cans in which to ship cream; the other coupon will bring you cans, free for 30 days. At the end of 30 days you pay us the ACTUAL COST OF THE CANS. We buy them at the very lowest prices and in enormous quantities to get such prices. We make no extra charge for them. Our patrons get them at the same low cost that we do. When you ship your milk to us you are dealing with the biggest and best, the old reliable, always square OHIO DAIRY COMPANY.

Order Blank for Tags and Seals

THE OHIO DAIRY CO.,
Columbus, Ohio:

Gentlemen—I have cans of my own. Please send me Tags and Seals, as I would like to ship you some cream.

Name

P. O.

Railroad

Shipping Station

Order Blank for Cans

No. Cows.....

THE OHIO DAIRY CO., Columbus, Ohio:

Gentlemen: Please send me two.....gallon Cans, so I can begin shipping cream to you.

It is understood that these cans are loaned to me for 30 days' trial, so that I may give your system of buying cream a trial. At the end of that time, if satisfied, I will purchase the cans at the regular price, as follows: 5-gallon, \$1.65; 8-gallon, \$1.80; 10-gallon, \$2.10.

Name.....P. O.....

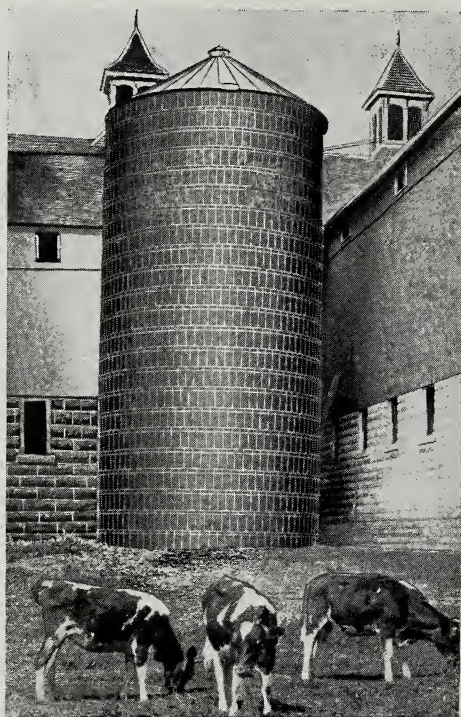
Railroad.....Shipping Station.....

The Ohio Dairy Company

TOLEDO—COLUMBUS—LIMA

(Ship to the nearest plant)

Please mention THE AGRICULTURAL STUDENT when writing advertisers.



Build a Silo That Lasts for Generations

Every reader of this agricultural college paper is looking for better ways of doing things. You are interested in better ensilage—better results from feeding. You know that a silo must have an air-tight, moisture-proof wall to keep its contents fresh, sweet and succulent. It is the wisest kind of economy, then, to build a silo that keeps ensilage in perfect condition until it is all fed to your stock—a silo that is not in continual need of repairs and soon has to be replaced. Erect a

Natco Everlasting Silo

(PATENTED)

on your place. It will stand for generations—a most sensible kind of monument to your good judgment.

The **Natco Everlasting Silo** is easily erected by any mason. Made of vitrified clay hollow blocks which are reinforced between each layer by continuous steel bands buried in the mortar. These blocks make a silo wall that never swells, shrinks, freezes nor cracks—no hoops to tighten, no painting, no continual outlay for repair.

Weatherproof—Decayproof—Fireproof—Vermينproof

Build a Natco Everlasting Silo and end your ensilage troubles forever. It's the most attractive as well as most durable silo you can erect—a valuable addition to your permanent farm buildings.

WRITE TODAY FOR FREE SILO BOOK

Our new silo catalog will interest you—describes fully the many features which make the Natco Everlasting Silo superior to others. Ask for Silo Book.

NATIONAL FIRE PROOFING CO., Canton, Ohio

Please mention THE AGRICULTURAL STUDENT when writing advertisers.